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INDEX TO CONTENTS, PAGE 385 . . . . . ADVERTISERS' INDEX, PAGE 24.

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CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

Recent Progress in Illuminating Engineering, by an Occasional London Correspondent 385

Some Practical Notes on Retort House Work, by Mr. Victor White. 386

*Report of the Committee (Mr. W. J. Serrill, Chairman) on Utilization of Gas Appliances, Seventh Meeting, American Gas Institute —Continued from page 375 387

EDITORIALS—

Briefly Told 392

The Finale at Atlanta—New Jersey State Gas Association, Winter Meeting—Annual Meeting, Society of Gas Lighting—Current Mention.

Natural Gas in Ohio During 1911 397

West Virginia Leads the Producers 397

Recent Patent Issues 398

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 398

Another Central Foundry Booklet—First Aid for Persons Overcome by Gas—December Issue, the "Vulcan Bulletin"—The Gas Educational Club, Tacoma, Wash.—The Burlington (Vt.) Gas Club—Production of Natural Gas—What do the Lawrence (Mass.) Gas Commissioners Have to Kick Over—Mr. A. D. Snow is Placed—New Purifying House, New Britain (Conn.) Company—Something from Stornmont, Canada—Under Two Flags—Wedding Bells—And Again They Ring—Bridgeton (N. J.) Plans a Whiteway—And Other Items.

The Market for Gas Securities 400

Meeting Times of the Various Gas Associations 400

Public Lighting Table for December, 1912 (Advertising Section) .. 10

Recent Progress in Illuminating Engineering.

[By an OCCASIONAL LONDON CORRESPONDENT.]

At the first meeting of the London Illuminating Engineering Society, which was held November 19th, quite a number of different subjects were touched upon. The first event of interest was the "Summary of Progress During Vacation," presented by Mr. Leon Gaster, the Hon. Sec., who had many important events to record. After referring to the recent reports of H. M., Chief Inspector of Factories on "Industrial Lighting," he mentioned that the Home Secretary in Great Britain had promised to appoint a Departmental Committee to deal with illumination. It will be recalled that a commission on the hygienic aspect of illumination has been appointed by the French Government, and it is considered a remarkable sign of progress that governments should be induced to take an interest in the subject in this way. The British Illuminating Engineering Society, it was pointed out, has only been in existence since 1909, yet it has already been able to get this important official recognition.

Another point of interest is the question of illumination in mines. Authorities have been concerned by the rapid development of a nervous disease of the eyes, termed "nystagmus," and recent investigations, by Dr. P. L. Llewellyn and others, show that this is apparently largely owing to the illumination being of a dim and flickering nature; better illumination in the mines is now being demanded. The Home Office recently organized a competition for the best miners' lamps, prizes to the value of £1,000 being awarded. A number of the lamps which were awarded prizes were shown at this first meeting.

Industrial illumination has also been to the fore at the "First International Congress for the Prevention of Industrial Accidents," where a paper on the importance of good lighting was read by Mr. Leon Gaster. A paper on illumination (by Mr. V. R. Lansingh) on behalf of the American Illuminating Engineering Society was also presented. About 450 delegates and members from various Governments were present, and it is believed that this Congress will be the means of arousing interest in illumination in very many important quarters.

Perhaps, however, the most interesting item in Mr. Gaster's report is the announcement that an Illuminating Engineering Society is about to be formed in Germany. While in Berlin Mr. Gaster paid a visit to the Reichsanstalt and, at the request of Dr. Brodhun and Dr. E. Liebenthal, gave them an account of the British Illuminating Engineering Society. The constitution will be modelled to a great extent on those of existing societies, and doubtless the German Society will reap the benefit of having such experience available. There are thus three illuminating engineering societies in existence, in the United States, Great Britain and Germany, and it may be hoped that they will heartily co-operate together.

It is recorded as a most encouraging sign that the gas and electrical interests in Germany should have co-operated together in this movement, both feeling how important such a society would be.

The Chairman of the Provisional Committee of the German Society is Prof. Warburg, Director of the Reichsanstalt, and Dr. E. Liebenthal will act as Secretary. The Committee also receives the assistance of Herr Dettmar, Secretary of the Verband Deutscher Elektrotechniker, and Dr. Bunte, Secretary of the Verein für und Wasserfachmänner.

In the concluding part of his report Mr. Gaster described his recent experiences in the United States, and warmly expressed his appreciation of the kindness shown. He mentioned that, at a special meeting of the New York Section, Illuminating Engineering Society, held August 1st, he delivered an address. He also spoke with special appreciation of the primer on illumination entitled "Light: Its Use and Misuse," issued by the American Society. It was proposed to publish this in a form slightly modified to suit the conditions in England in a coming number of the "Illuminating Engineer," London.

In conclusion, a word or two was said on the important meeting of the British Commercial Gas Association recently held in Manchester, which it is hoped would be beneficial not only to gas but to illumination in general.

The next item of the programme was a display of ancient forms of lamps, from the collection of Mr. J. W. Johnston, who gave a most interesting account of these specimens, gathered in many far countries, including Portugal, Norway, China, Japan, British North Borneo, etc.

Mr. Haydn T. Harrison then explained his new form of simple photometer, which is very compact and portable, and carries a Bunsen disk illuminated by a stationary glow lamp. The illumination range is varied by adjusting a resistance in series of the lamp and a very

wide range can be obtained in this way. It was suggested that the instrument would be quite useful in connection with street illumination where very low values had often to be measured.

Mr. J. S. Dow next showed a series a slides illustrating the use of photography in illuminating engineering. He explained that, since his association with the "Illuminating Engineer" he had been struck by the need for good photographs and illustrations showing the distinction between good and bad lighting, for he thought it was most important to lighting companies to have the pictures of their installations for display. A few years ago very little was known of photography by artificial light, and he approached Mr. Mackinney. In conjunction with him they read a paper before the Royal Photographic Society on this subject.

Good photographs should show not only the details of the room itself, but also the lamps and shades in position without distortion or halation. In order to judge the exposure the use of an illumination photometer, for measuring the surface brightness of various objects in the room, was found very serviceable.

Some of the illustrations shown contain figures of people seated at tables. Mr. Dow explained that it was hard to get photographs of figures by artificial light in this way, it being so difficult to use a really short exposure by the light of incandescent electric lamps. The problem was somewhat easier when such illuminants as the arc light and the Moore light were used. At present it hardly seemed possible to get genuine snapshops by artificial light.

Mr. W. C. Clinton then showed a series of ingenious boxes, lined with paper of various kinds, to show the effect of reflection from different types of wall paper.

Finally, the various miners' lamps were shown and exhibited. In his concluding remarks the Chairman mentioned that an international cinematograph exhibition was to be held in London next year, and it was possible that some of the members present might like to participate.

It is evident, therefore, that the Illuminating Engineering Society is dealing with a great variety of subjects and doing useful work. One other point mentioned at this meeting might be added; namely, the work of the joint committes now in existence to deal with school and library lighting. It was explained that the London County Council had consented to allot two schoolrooms to the School Lighting Committee in order that they might be lighted by gas and electricity in a model manner. The reports of these two committees have not yet been issued; but, when available, they should make very useful and interesting reading.

Some Practical Notes on Retort House Work.

[Prepared for the JOURNAL, by MR. VICTOR WHITE.]

The science of gas making has been so very fully treated both from its scientific and commercial aspects, it would almost appear that little else remained to be said upon the subject which would be of definite interest to those engaged in gas production. There are, however, a large number of small points that are of a strictly practical nature, and which, unless carefully attended to, may lead to a certain amount of difficulty and trouble in the routine operation of the gas works; but, inasmuch as the practical side of this work is as important in ultimate results as the theoretical and financial considerations underlying the gas undertaking, it is thought possible that one or two brief notes concerning practical details may be not without interest. It is not proposed in these notes to enter at all into the principles underlying the gas production, but simply to detail one or two points which to a good many gas works' engineers will be considered of an elementary character, but which nevertheless exercise a direct influence upon the satisfactory working of a plant. It would, of course, be impossible in the course of a short article to cover the whole range of apparatus employed in a gas works, so that it is here proposed to deal with the practical side of the question in relation to the retort house.

As in most industries, there is a great temptation on the part of the management to reduce capital charges to the least value possible; this extends also to the repairs' bill. It is, however, unfortunately the case that, beyond a certain point, any cheapening in the cost of materials leads inevitably to an accumulation of trouble which manifests itself at a longer or shorter period after the repairs have been effected, and this is especially manifest in cases where, for the purpose of maintenance or repair, goods are bought on the tender basis. The only safeguard that can be suggested in such cases is to make the specification for the materials so stringent as to provide adequate safeguards over the quality of goods supplied, and then for the engineer or manager to see that the points of the specification are stringently complied. For example, in the purchase of fireclay goods for retorts' work it is almost inevitable that, if the practice of accepting lowest tender without due regard to quality is persisted in, there is considerable danger that undue deterioration will set in; and cases have been known where, owing to this cause, several beds of retorts have fused down before the proper carbonizing temperature has been reached. This is only one example of a large number of similar troubles which may be experienced if careful attention be not given to this point.

When the materials are bought it is essential that the engineering aspects of the plant should be carefully considered, for otherwise there is very great danger of mechanical failure. Any attempt to unduly diminish the quality of material, or the strength of support, is almost certain to involve trouble and even disaster. In one instance the hydrualic main suffered considerable trouble, in fact collapsed, owing to the fact that insufficient mechanical support was given to the main. In this case, instead of placing the supports of the hydraulic main on cross girders of structural steelwork, these supports rested on the brickwork of the arches. During the course of operation the brickwork sunk slightly, leaving the main unsupported for a considerable portion of its length. This threw a largely increased, and altogether unnecessary, strain on the bolts holding the cast iron mouthpiece on to the fireclay retort, and inasmuch as the mouthpieces themselves were not properly supported across the front of the oven, the mouthpiece in question dropped to a considerable extent, and in this way a further strain was thrown on the hydraulic main. Given, the proper factor of safety, it might have been possible for the plant to have survived even this undue distortion; but, as it happened, there was a piece of defective wrought iron in the main, with the result that fracture ensued. The ultimate result of this was that the tar and liquor, of course, escaped, and it was only by the presence of mind and promptitude of the operator in charge that a serious fire was averted. It was, of course, impossible to continue gas making until the main had been brought back into position, patched, and thoroughly supported. Although this sounds like a somewhat extraordinary circumstance, and one involving a number of accidental factors which intervened before the breakdown became possible, it will probably be within the experience of a good many practical gas works' men that trouble of a somewhat similar nature, in some part or other of a retort house plant, has only been narrowly avoided, and it is, therefore, a prime rule that the considerations of mechanical construction should be as carefully studied by the gas engineer as the actual operations of gas making.

Another instance which shows that the engineering features of a gas works plant should be carefully considered, both in laying out and in operating the works, may be given, inasmuch as too much stress cannot be laid upon this important point. In the case considered, the gas works was erected near the banks of a river, which, although normally confined to a narrow course, was subject at irregular intervals to a very largely increased flow, especially in the rainy season, inasmuch as it formed the outlet to a large tract of lowlying country. The obvious result of this was that, when the river was in flood, it overflowed its banks, with the result that adjacent property was liable to be inundated. The gas works under consideration was a small installation, working fairly well up to its full capacity, and it was found that the cellars of a bench of retorts in this plant was, owing to the fact that the bench was below the high water mark of the river, liable to be flooded by water flowing into the cellars. This, of course, had the effect of extinguishing the fires and gas making was seriously interfered with, until it was decided to build a concrete wall around the ordinary walls of the building, and to lay concrete floor in the cellar, making it thoroughly watertight. This was certainly the best way of overcoming the difficulty, but reference is made to it on account of the fact that it is necessary, in laying down a gas works plant, to take into account features of the nature described which may seriously interfere with the smooth working.

A good deal of the difficulty and trouble which occasionally arise in the retort house are often due to the fact that, owing to the expansion of the business of the undertaking, the plant is called upon to work at a rate which either comes fully up to or even exceeds its correct capacity; and, when this occurs, times of anxiety are almost certain to be found. This requires careful handling both of the plant and of the men, and it is here where the value of experienced man-

ager is found. If care is not exercised, the misdirected zeal of the carbonizing foreman may easily result in beds being fused down. With several designs of furnaces, it is a comparatively easy matter to increase the temperature of the ovens beyond the melting point of most fireclay materials upon the market, and if the engineer tries to obtain more gas out of the coal than the coal contains, serious trouble is often courted. The most satisfactory method of regulating carbonizing temperatures is to adopt a method of regulation by means of pyrometric readings. The cost of a pyrometer of a good, modern type is insignificant, compared with the value of the interests involved, and by the installation of a set of pyrometers, having a dial fixed in the manager's office, operated electrically, it is quite easy for the manager to keep at all times a careful eye upon the operation of the retorts. There is a carbonizing temperature for each particular coal used in gas manufacture, which is the best for that coal, and this temperature will always be found well under the fusion point of good, fireclay retorts. The pyrometer enables the manager to determine this temperature and to work it as closely as possible, from which point of view alone it is worth its weight in gold. Moreover, it has the great advantage that it enables a check of a continuous nature to be kept on the operations of the fireman, especially if the pyrometer readings are recorded on a time chart such as is often supplied with modern instruments. If, for example, the ovens of retorts have been working satisfactorily for some time, when suddenly the heat drops; the pyrometer will at once indicate the same, and it will usually be found that the same is traceable to badly cleaned fires. The remedy for this is to talk to the fireman about it in a confidential and earnest manner, for against the automatic and indisputable evidence of the pyrometer he can say nothing.

The undue forcing of the making of gas, although, of course, the outcome of strong temptation in many heavily worked plants, should be strongly resisted, as it is almost certain to involve the works in ultimate trouble. Where, for example, the heats are very much increased, in order to make as much gas as possible to get over a peak load, it is probable a result will be that the hydraulic main will very quickly become filled with thick tar and pitch. This is almost certain to cause a partial or complete stoppage of the works, and is most difficult to get rid of, the only method being to clean the obstruction by means of steaming. This is usually found that the more satisfactory way of regulating the working of the hydraulic main, especially in heavily worked plants of the nature discussed, is by the employment of a tar tower. If this is properly operated, the dip-pipes will be sealed in liquor; thus the tar then runs away from the bottom of the main as quick as it is made, enabling the plant to be worked at high capacity.

Another effect of forced work and overheating is the stopping of ascension pipes, and pressure in these pipes is also traced to working with a heavy tar seal in the hydraulic main. The trouble which is, of course, traceable to the hydraulic main itself, can best be obviated by the proper working of the main as described above.

It would be possible to continue discussion of the troubles in the retort house to a very considerable extent, but the exigencies of space prohibit this from being done. It may, however, be valuable, in concluding this set of notes, to refer to a type of difficulty which arises more particularly when a portion of the plant has been shut down for a longer or shorter period, and it is then attempted to put the plant into operation again. It should be remembered that, when lighting up beds of retorts, it is absolutely essential that the combustion chamber should be at least at a bright cherry heat before any damper on the beds are opened leading into any main flue into which hot waste gases are flowing from other beds. If this detail is not attended to it is almost certain that an explosion of a more or less alarming nature will occur, owing to the fact that the heat contained in the waste gases from the other beds are sure to fire the unburnt producer gas, ensuing from the new beds. Cases have been known where a number of new beds have been absolutely wrecked, owing to the dampers being injudiciously opened before a sufficiently high temperature has been obtained in the combustion chamber to burn the producer gases formed. Although this point sounds almost too obvious to mention, it is thought that actual experience demonstrates the danger quite sufficiently for its mentioning.

Before putting plant to work, again after a period of inaction, it is advisable to thoroughly overhaul and examine the construction before reliance can be placed upon it to perform its work satisfactorily. In one instance, for example: A number of beds of retorts, operated on the regenerative principle, had been standing idle for a considerable period; but, owing to increased business, it was decided to bring them again into working commission. This was done without giving the retorts an effective overhaul, and fires were put into 4 of the furnaces. When, however, the retorts were approaching their carbonizing tempernture, the tie-rods connecting the 4 end buckstays gave way under the strain put upon them, due to heat expansion. The result was a good many of the retorts were so badly cracked that their effective working life was reduced to about ½ the fairly attainable period. In this case the tie-rods (of wrought iron) had been built into the brickwork forming the top of the arches. It is, therefore, probable that the continual heating that the tie-rods had received during the time that the plant had been previously at work had weakened them. Following this during the period of inaction a certain amount of dampness in the atmosphere had caused them to corrode, with the result that, when fresh strain was put upon them, they gave way. When this retort house plant was overhauled at a later date, care was taken, in renewing the rods, that, so far as possible, they were kept entirely clear of the brickwork, in which way the tendency for direct transmission and collection of damp was avoided. This is a detail point in the construction of brickwork tied with iron rods which should be carefully watched, as there is nothing else more conducive to the corrosion of iron and steel work than direct contact with material such as brickwork, which, being of a porous nature, collects and retains moisture.

In opening out plant afresh for work, the temptation to get the retorts away without previously overhauling is very great, inasmuch as the time allowed is usually short, but such overhauling is absolutely essential, and more time is frequently wasted in the attempt to get away under unfavorable conditions than would have been spent in the first instance in getting an efficient overhaul. For example, in one retort house, where a rather sudden call was made upon some spare beds, it was found that, after 3 beds were lighted up after standing for a considerable period, great difficulty was experienced through the retorts failing to heat up. The difficulty became so acute that the production of gas of sufficient quantity to meet the demand was seriously threatened. Investigation developed the knowledge that all of the trouble was due to the fact that each bed of the bench of retorts had a separate chimney, each of which chimney inlets had become choked with an accumulation of dust during the period of inaction. Evidently, if a few minutes had been spent in looking round the plant in detail, and in clearing away this accumulation, for instance, 2 or 3 hours of anxiety would have been avoided.

The above notes do not profess to be a complete investigation of all the practical troubles which afflict the life of a retort house manager, but they are sufficient to indicate the need for a real practical and working knowledge of mechanical details as well as the practical points connected with gas production. It is felt that time is not wasted in drawing attention to these points, inasmuch as actual details of practice are apt to become submerged under the flood of literature that the art of gas making in its higher advances and developments has called forth. They are, therefore, submitted in the hope that they may be not without their value.

(Continued from page 375.)

Report of the Committee (Mr. W. J. Serrill, Chairman), on Utilization of Gas Appliances, Submitted at the Seventh Meeting, American Gas Institute.

Gas Room Heaters.—The use of gas for heating rooms grows apace and, with the gradual reduction in the prices of gas, this use is probably destined to increase until the quantity of gas used for this purpose forms an important item in the total output. The conditions under which gas is used for room heating in this country are such that your Committee believes it is warranted in devoting considerable space to an examination of the principles and methods employed.

The heating of residences exclusively by gas, by means of a heater located in the basement, is, at current prices for gas, rendered impracticable by the high cost as compared with heating by coal. This method is practised to a small extent, but not sufficiently, in the opinion of the Committee, to warrrant a further discussion at this time. We will, therefore, proceed to the consideration of those types of gas heaters which are located in the rooms being heated. These heaters may be divided into two classes: Those designed to be set in the room, here called for convenience, portable heaters, and those designed to be set in a fireplace in the room, here called fireplace heaters. Each of these classes contains heaters constructed on either

one or two main principles of combustion: The yellow flame type and the blue flame type.

Taking, first, the portable heaters. In those of the yellow flame type, the gas is burned on the same principle as in an ordinary lava tip or bat's-wing burner; there is no pre-admixture of air; the burners vary in design in different makes of heaters; the oxygen for combustion is obtained from the atmosphere surrounding the flames; the flames are not permitted to come in contact with any solid body, but are free to extend into the atmosphere of the combustion chamber until the combustion has been completed. This latter point is always carefully secured in the design, because without it the heater would be rendered impracticable by the deposition of carbon which would take place on any body that the flame was permitted to touch. The products of combustion from these heaters are odorless and innocuous.

In portable heaters of the blue flame type, the gas is burned on the bunsen principle, the burners being of various forms in different makes of heaters. There being no obvious objection, such as the deposition of carbon, to the contact of the blue flame of these heaters with solid bodies, similar care to prevent such contact is not exercised in the design; on the contrary, such contact is frequently purposely effected, especially where water is contained in the heater, and the purpose is to circulate, or vaporize the water. As already explained in the report, the result of such a contact between the gas flames and a relatively cool metal surface, is an incomplete combustion of the gas. This phenomenon is accompanied by an objectionable odor, which is a bad advertising medium for gas as a source of room heating.

There is on the market a class of blue-flame, room heaters, in which the effects just described are minimized. In this type the flames play around a plate of refractory metal, so enveloping it to cause it to glow within after the heater is lighted. This red-hot plate does not reduce the temperature of the flame sufficiently to cause incomplete combustiou to an appreciable extent, consequently a heater of this type, after it has been lighted long enough to cause the iron plate to glow, is free from the two objections of incomplete combustion and an objectionable odor.

The most serious objection to portable heaters of the blue-flame type, still to be stated, is the possibility of the burners in these heaters lighting back at the mixers. As already explained, such burner when burning at the mixer, delivers a product of incomplete combustion (Exhibit B). Room heaters are often used in poorly ventilated rooms, and the very condition of temperature, which leads the consumer to light the heater and keep it burning, also leads him to keep the windows and doors shut, thus reducing the ventilation to a minimum.

It may be claimed it is not probable that anyone would permit the burner at the mixture to continue. The two warnings given by this condition of the heater are the odor and the noise; the former is not as pungent, nor is it as universally recognized as unburned illuminating gas, and a person even when wideawake, as in reading, might not notice this odor, which will increase in intensity only gradually. Very drowsy persons, or those more or less under the influence of intoxicants, would be very apt not to notice it. The same may be said of the noise which varies from a hiss to a roar, and is loud enough to be noticed by many persons. On the other hand, others would not notice it, and still others, noticing it, would not take any steps to stop the cause of it. These considerations lead your Committee to recommend that, in handling room gas heaters of the portable class, gas companies confine their practice to those of the yellow flame type.

But, it may be said, certain classes of blue flame heaters are more efficient than yellow flame heaters, and if gas companies adopt the practice just recommended they will be compelled to sacrifice something in efficiency. Such is not the case; but as there is considerable confusion on the subject of the efficiency of gas heaters, we think the subject of enough importance to warrant our considering it in some detail. The complete combustion of a cubic foot of gas will produce the same number of heat units, whether the gas is burned in a yellow flame or in a blue flame burner; and as all the heat generated is delivered into the room, there being no flues to heaters of this class, it follows that one type is as efficient as the other. But different heaters distribute the heat they generate in different ways, and it is a common opinion that those heaters which send out the largest proportion of heat in the radiant form are the most efficient. So far as engineering or mechanical efficiency is concerned, this opinion has no foundation in fact. The total quantity of heat generated in such a heater may escape from it in one of three ways: By conduction through the floor and pipe connection; by radiation through space; or by convection through the heated air currents and products of combustion arising from the heater. The heat given out by conduction is too small in amount to warrant consideration. The heat escaping in the form of radiant energy is intercepted by the floor, walls and ceiling of the room and by the objects in it, each of these substances being warmed by this radiant energy, so that they in turn become secondary heaters, each one starting convection currents of its own by warming the air in contact with it. As the atmosphere of a room is a perfect fluid, starting in motion on the slightest change in density due to a change in temperature, there is in a room warmed by a source of heat within it, under similar conditions of loss of heat through walls etc., a constant relation between the temperature of the air at the ceiling and the temperature at the floor. It follows that, whether all the heat generated be carried in one convection current from the heater toward the ceiling, or whether only a portion of it be so carried, the balance being radiated to the walls and furniture, and by them sent through convection currents toward the ceiling, the result is the same. The room is heated to a desired temperature with equal speed, or is maintainsd at a desired temperature, with the like consumption of gas. Assuming complete combustion in each case, the mechanical efficiency in heating the atmosphere of a room is the same in a heater with a minimum of radiated heat as it is in one producing a maximum of radiated heat. But in reaching this conclusion, the whole story has not been told; the mechanical efficiency is not in this case the real measure of the relative usefulness of gas heaters, because of the human element which becomes a factor in the problem by the effect on the occupant or occupants of the room by those waves of radiant energy which impinge directly on the body. After all, rooms are heated for the purpose of making them comfortable and healthful to the occupants, and, in the attainment of these ends, the actual temperature of the air at a level within 6 feet of the floor, as determined by a thermometer screened from the direct effect of radiant heat, is not the sole factor. If there be in the room a source of radiant energy, some of the rays from which are permitted to fall directly on the human body, these rays, which, in their passage through the air, do not warm it, are very effective in producing a sensation of warmth on the body. A person who is so situated in a room that his body intercepts the waves of energy from a source of radiant heat, will be comfortable at a lower temperature of the air (measured by a screened thermometer) than the temperature that is needed for comfort in a room with no radiant source of heat, or in case a source exists, if the person be screened from the direct effect of the rays.

Thus we see there is another kind of efficiency—it might be called the "physiological" efficiency—the degree of which is dependent on the percentage of the total generated heat that is emitted in the form of radiant energy; and the room heater which attains a high physiological efficiency is more effective, not in heating the air of the room, but in making it comfortable for the occupants, than is the heater in which such efficiency is low. It is, therefore, a matter of interest to inquire whether of the blue flame type, or of the yellow flame type, of room heater, either one has an advantage over the other in the generation of radiant energy. To the best of our knowledge, no reliable figures are available for the final determination of this point, but the test shown in Exhibit C indicates the lines on which further investigation should be made. In the absence of definite results, it may be stated it is the belief of the Committee that the two types of heaters are about equal in this respect; as they exist on market, there is little to choose between them on the score of the emission of the heat in the form of radiant energy.

The result of our discussion, on gas room-heaters of the portable class, is that it is to the interest of the gas industry to handle the yellow flame type, and to discourage the blue flame type, of heaters; the former possesses all the advantages and none of the disadvantages of the latter. It produces no odor, it maintains always a complete combustion of gas, and, having no mixer as a part of its burner, it is free from the liability of lighting back.

Fireplace heaters, while subject to the same general principles as those governing portable heaters, demand some additional consideration. Of that class, which, designed to be set in a fireplace, yet is not designed to make use of the flue leading from the fireplace, for the purpose of carrying away the products of combustion, it may be said that the heaters belonging to the yellow flame type are unobjectionable; the products all mix with the atmosphere of the room, but they are odorless and innocuous. On the other hand, the blue flame type of this particular class of heaters is, generally speaking, even more

objectionable than the same type of portable heater, due to the fact that the shape such heaters must assume, in order to accommodate themselves to the fireplace construction, is a shape in which it is almost impossible to secure perfect combustion. The combustion surfaces of such heaters must be set in a generally vertical position, and it is impossible to burn gas through ports in a vertical metal surface (where the flames issue horizontally) and at the same time secure perfect combustion; each flame as it issues turns itself upward, the upper portion of the flame licks against the metal surface, thus being cooled, and delivers some products of incomplete combustion, with their accompanying odor.

Another cause of incomplete combustion in these heaters is the vitiation of the secondary air supply to the upper rows of burner ports. The products of combustion from the lower ports rise over the face of the upper ports, so that the latter are compelled to burn the gas issuing from them in an atmosphere deficient in oxygen. In many heaters these effects are enhanced by the attachment of some non-combustible substance, like fibrous asbestos, on the face of the combustion surface; this material (introdued for the purpose of imparting a pleasant glow to the heater) is an important factor in the prevention of complete combustion. It blocks the gas ports to a greater or less extent, it accumulates dust and dirt, still further blocking the ports, and it brings additional obstruction to the passage of secondary air to the flames. A careful inspection of a heater of this type in operation will frequently reveal an intermittent extinguishing and relighting of the small flames issuing from numbers of the ports. These heaters are also subject to the same objections from the backfiring of the burners at the air mixers as have already been described in the case of portable, blue flame, heaters.

Your committee concludes that, in selecting gas fireplace heaters, of the type that does not utilize a flue, it is to the best interest of gas companies to take those of the yellow flame type, of which, fortunately, there are attractive forms on the market.

Of the fireplace heaters, that do make use of the flue, these are practically all of the blue flame type, and, as the products of combustion are carried out of the room (even the products from a back lighted burner being thus removed) there seems to be no objection to this type. Gas logs and similar heaters of this class are unobjectionable, as long as the flue to the fireplace in which they are set is *effective as a flue*, and is not a flue in appearance only; otherwise they are open to all the objections that have been raised against flueless, blue flame, fireplace heaters. In setting these heaters, if a damper exists in the flue the damper should be so adjusted that the flue cannot be entirely shut off.

An objection frequently urged against heaters of this class is that only a portion of the total quantity of heat generated by the gas is utilized in heating the room, the balance escaping to the chimney where it is wasted. While this is true, yet it should be borne in mind that this is the most healthful method of room heating by gas, in that there is not only no dilution of the air by products of combustion, but, on the contrary, a direct ventilating effect is caused by the air withdrawn from the room by the heater. At prevailing prices for gas there are many consumers who, if made to realize the force of this argument regarding sanitation, will gladly adopt this method of heating in preference to any method that delivers products of combustion into the room.

In this connection it should be pointed out that, in this class of heaters, it is only the heat given out in the form of radiant energy that is effective in heating the room, or in warming the occupants; all of the convected heat is carried up the flue. In discussing this subject, in connection with portable heaters, we found that, although the extent to which those heaters emit heat in the radiant form is in a certain degree a measure of their excellence, yet we were able to show that the distinction between heat convected and heat radiated from such heaters was not an important one, in its effect on the warming of the room. In the class of heaters we are now considering, it is evident that this distinction becomes of the greatest importance; if all of the convected heat is wasted, the design of the heater should be such as to reduce this loss to a minimum; and, conversely, to increase the amount of heat generated in the radiant form to a maximum. Your Committee thinks it probable there is room for the design of more efficient heaters of this class than have yet been produced.

Gas Pipe and Tubing.—The methods of getting gas to appliances in which gas is used as a fuel, as distinguished from lighting appliances, form an important part of our subject. In general, it may be said that gas ranges, water heaters of all types, and industrial appliances are always substantially connected with iron piping, which is entirely satisfactory on the score of safety. The same may be said of gas room heaters of the fireplace type. On the other hand, hotplates, miscellaneous small cooking appliances, and room heaters of the so-called portable type, are quite commonly connected with flexible tubing. In one way or another, this practice of using flexible tubing is the cause of more cases of asphyxiation than all other causes in which gas appliances are factors put together.

Flexible tubing, of the metallic spiral type, both rubber-packed and asbestos-packed, is coming into quite general use for the connection of gas portable lamps; when so used the tubing is so placed that it is ordinarily left undisturbed for long periods of time. This tubing will not stand frequent or careless bending or disturbance; therefore, while it gives satisfaction in the service just described, it is of doubtful utility when used with hot plates or heaters, which are usually connected and disconnected with some regularity by the consumer; or, if not, are so located that the tubing connected to them is liable to be disturbed. For these reasons rubber tubing is generally used with those appliances.

It is scarcely necessary to state that rubber (or so-called rubber) tubing is very far from being an ideal material for the purpose; it changes in character and flexibility by exposure to the air, it becomes more or less porous in use, and it develops cracks which leak gas. It is manufactured in different grades of excellence, but the conditions under which it is sold usually facilitate the introduction of the inferior grades into the humble homes, where, on account of the rooms being relatively more crowded, the risk of disturbance or injury to the tubing is greatest. Even the better grades are liable to the troubles above mentioned. The use of the inferior grades should be prohibited.

These weaknesses that exist in rubber tubing are, however, really insignificant compared with the danger introduced by the usual method of connecting the tubing to the piping and to the appliances. The slip joint so commonly used is so dangerous, and is the cause of so many cases of asphyxiation throughout the country every year, that your Committee believes the time has come when the gas industry must cease practising its present policy of ignoring the subject, and seriously take under consideration the question of relief. Almost every manufacturer of an appliance, or of an independent connection, has his own design of metal nozzle on which the end of the tubing is intended to slip; and almost every manufacturer of tubing has a special design of rubber "end" to fit on these metal nozzles. Some of these combinations of nozzles and ends are undoubtedly more effective than others, but the best of them is not proof against accidental displacement, nor will it undergo the process of continual separation and making up, which is necessary to fulfill the "portable" character of the appliance, without becoming looser each time the process is repeated, until finally it becomes dangerous. Any form of wire holder or "safety clamp" is of little real protection, because it must be removed every time the joint is broken, and there are few consumers who will take the trouble to replace the clamp each time the joint is made.

What is the remedy? It is the prohibition by law or municipal ordinance of the use of flexible tubing for connecting gas room heaters and cooking appliances in dwellings or in rooms occupied as offices. This means that iron pipe should be used, and that the "portable" character of such appliances must be abandoned. The latter will not prove a serious handicap, as the initial cost of such appliances is not great, and any community, after it has once become accustomed to this new condition, will probably use as much gas through such appliances as it would have done had the flexible connection been continued in use. The use of flexible tubing would then be limited in dwellings to the connection of appliances consuming only small quantities of gas, such as internally heated irons or portable lamps, and in business places to certain industrial appliances. Such a law would be difficult of absolute enforcement, but its moral effect would be great, and, with the co-operation of the gas companies, the authorities would not find the practical enforcement of the law a serious difficulty. It is probable that the absence of rubber tubing as a common article in the household will be a factor in reducing the number of suicides by gas.

In the meantime, the different gas companies may do much in alleviation of the evil. They may abandon for such purposes the handling of rubber tubing and the connections required for its use, selling to their consumers these heating and cooking appliances only on condition that they be connected with iron pipe. Some gas companies, it is understood, already follow this practice; others, who have not seen their way clear to go so far, will sell room heaters for

use in bathrooms and bedrooms, only when connected with iron pipe, heaters for other rooms being sold for connection with tubing. One company, within the knowledge of the Committee, while adhering to the use of rubber tubing, has abandoned for such purposes the use of the slip-end, using in its stead a form of union in which the joint is made by the contact of a sharp metal edge against a conical soft metal seat. The "independent connection," or fitting which attaches to the house piping, is made with the conical, soft-metal seat, in place of the old slip-joint nozzle; the union, which is attached to the rubber tubing by glue, has thumbhead handles, so that the consumer may unscrew it by hand from one "independent connection" and connect the appliance to another one, say, in another room. On the other end of the length of tubing is glued a threaded nozzle which screws to the pipe on the appliance.

Gas companies are urged, each one being guided by the conditions existing in its own territory, to lay their plans and shape their practice towards the ultimate abandonment of the slip-end and of the flexible tubing, and, pending the attainment of this desirable end, to adopt such practice as may minimize the danger resulting from their use. Unfortunately the gas company cannot, unaided by the municipal authorities, prevent the sale of slip-end, tubing and fittings by plumbers and department stores, but it may do much by discouraging the use of the slip-end and by making the way as easy and cheap as possible for the use of the iron pipe connection. A refusal by the gas company to supply and attach the ordinary form of "independent connection" that is fitted with the slip-end nozzle will in itself be an important factor in checking an increase in the number of these undesirable joints.

Connection Details.—Before leaving this subject of the connections to heaters, the Committee makes certain suggestions, as follows:

There should always be a cock at the heater, so that a person lighting the heater may apply the match to the burner immediately after the gas is turned on. If the connection is of iron pipe, this cock at the heater is the only one that is needed; but if the connection is of flexible tubing another cock is required at the wall-end of the tubing, and the consumer should be advised to shut both cocks each time the heater is discontinued in use. The failure of consumers faithfully to follow this practice is a serious objection to the use of rubber tubing for this purpose; either the gas pressure is left continuously in the tubing, thus increasing the risk of asphyxiation, or the gas is turned on at the wall and the light is applied after the person has walked to the heater, thus incurring the risk of exploding the heater.

An additional important factor, from the viewpoint of safety, gained by the use of iron pipe, is the abolition of the cock at the wall-end of the heater connection. The fact that no such cock is required has just been mentioned; it remains to be explained why its absence contributes to the safety of gas consumers. One of the most prolific sources of asphyxiation is the immediate proximity of the two gas cocks at the wall, one on the lighting bracket, and one on the independent connection, controlling the supply to the heater. A consumer wishing, say, to light the burner on the bracket, inadvertently opens the cock to the heater; finding that the bracket burner will not light, he realizes his error, and at once opens the bracket cock and lights the burner. He neglects, however, to close the heater cock, and the gas thus escapes unburned through the heater. This neglect may seem criminally careless, but it is a fact that many persons are thus careless, mental conditions induced by intoxication, drowsiness, or absent-mindedness being often contributory causes. The proximity of the keys of the two cocks is really the condition which causes this class of accident, and fortunately it is so easily prevented that no gas company is justified in continuing the practice of so placing them. The ordinary "independent connection," which is a simple tee form of fitting, with a cock on the side outlet, should not be tolerated; in its place should be substituted a special form of fitting. There is one in which the side outlet beyond the cock contains a bend of 90° so that, when the fitting is connected to an outlet of the house-piping, back of a wall bracket, with the nozzle for the tubing pointing vertically downward, the key to the cock on this fitting, instead of being located under the fitting alongside of the key to the bracket cock, is turned upside down so that one key is above, and the other is below these fittings. Another special form of independent connection has a long stem on the side outlet, the cock which controls the heater being on the end of this stem. The two cocks are thus not immediately adjoining. While these arrangements may not be sure preventives of the form of accident under consideration, it is believed that they will materially reduce it, and the devices are so simple that gas companies, who do not see their way clear altogether to abandon the rubber tubing connection for heaters, would seem to have little excuse for not adopting one of them.

Cocks without stop-pins, either originally so made, or from which the pins have been lost, are not infrequent cause of accident; the fitting departments of gas companies should be equipped with the tools necessary to insert the stop pins, and should be instructed to do so when any gas cock so lacking is found in a consumer's house. Cocks that have worn or loosened, so that they turn too easily, also produce accidents. The fitting departments should be ready to remove this source of danger, either by repairing the cock or by substituting a new one. Those employees of gas companies whose duties take them into the houses of consumers, should be instructed to be on the lookout for these defective fittings, and should be made to realize that it is a matter of important interest to their industry that such possible causes of accident be eliminated.

Section V.—Lighting Appliances.

The modern gas company is practically forced into the field of illuminating engineering. The advent of the numerous types of incandescent gas burner, the development of glass reflectors, the competition with electric lighting, and the growing popular demand for more light, and for more effective illumination, have combined to produce this result. If gas is to hold its own in the lighting field, the gas companies must attack this problem vigorously and efficiently. The Committee makes the following suggestions: Each company should have in its employ at least one man whose business it is to be expert on the subject of illumination, and who, by education and experience, is fitted properly to lay out and install lighting installations for gas consumers. The company should realize the value to it of special knowledge in such a man, should have him become a member of the Illuminating Engineering Society and supply him with current literature, so that he may keep abreast with the latest developments of the subject.

Gas companies should confine their use to the better grades of lighting appliances, and they should refuse to handle the cheaper forms of incandescent lamps. This policy is of special importance in connection with the use of gas mantles. Only the best grades should be handled by gas companies, who should do everything to discourage the purchase by gas consumers of the cheap and poor mantles that are on the market. The facts that the manufacture of electric lamps has been so thoroughly standardized, that these lamps are of a uniform quality of excellence, and that the electric lighting companies generally refuse to handle or supply anything but the best lamps, serve to give the electric companies an immense advantage over the gas companies, many of which will carry all grades of mantles and incandescent lamps in stock, and will sell them to consumers.

Some attempts to standardize the gas lamps and mantles that come on the market have been made, and the subject is surrounded by many difficulties, but the Committee believes the Institute should take the matter up by the appointment of a special committee to consider it.

On the score of safety, there is but little to say with reference to lighting appliances. The use of nets on the globes of arc lamps is advisable. Exhibit "D" in the Appendix contains the results of a test, conducted at the Photometrical Laboratory of the United Gas Improvement Co., on the liability of hot parts dropping from incandescent burners to set fire to inflammable materials on which they fall. The avoidance of any risk of setting fire to the ceilings above gas lamps is another precaution to be observed. Exhibit "E" in Appendix contains curves showing the temperatures which obtain at various distances above several types of lamps.

Section VI.—Gas Fixtures.

Your Committee believes that the Institute should actively take up the question of the construction of gas fixtures. There is probably no other branch of gas engineering which has been so neglected by gas engineers, individually and collectively, as has the design and construction of gas fixtures. Reference here is not made to the artistic design or appearance of fixtures, but to their capability of properly performing the functions of containing and transmitting gas, and of withstanding the strains to which they are subjected. The gas industry has paid, and is paying, dearly for this neglect. The desire on the part of builders to cheapen the construction of houses that are being built for sale, and the competition among fixture manufacturers for this trade, have, in the absence of any restraining influence on the part of the gas companies, flooded our cities

with fixtures of poor construction. The material is too light properly to meet the strains, and the cocks, which are the working parts of the fixture, are so poorly designed and constructed that they develop leaks. These leaks are not usually large enough to be dangerous, but are constant sources of annoyance to consumers and of expense to the gas companies. In many cases the design is such that a removal of these small leaks is impossible.

This condition is so bad an advertisement for gas that we are not warranted in continuing it, especially when the remedy does not involve a large increase in the initial cost of fixtures. As an introduction to the subject, the Committee offers a proposed "Fixture Specification," in Exhibit F of the Appendix. This specification has been prepared by The United Gas Improvement Company in Philadelphia for adoption by that Company in its practice.

The specification of the fixture cock contained therein has already been adopted; it controls the design and construction of the cocks on fixtures that the Company handles, and on those which are hung by builders in any new houses in Philadelphia. That Company controls the latter class of fixtures through the authority it has received from the City Councils to regulate the introduction of gas piping and fixtures. The other portions of the specification are still in process of completion, and are, therefore, not yet in use. The Company is consulting the principal manufacturers of fixtures in the country. The idea of the specification is that it will permit the use of inexpensive fixtures, prohibiting only those features which it is believed will prevent the fixtures from giving a permanently satisfactory service. The Committee believes the Institute owes it to the best interests of the industry, and of the gas consumer of the future, to lend its authority to the adoption of a limiting specification of the kind here submitted, and suggests the appointment of a special committee to consider it.

EXHIBIT B.—COMPOSITION OF PRODUCTS OF COMBUSTION OF WATER AND ROOM HEATERS.

Test Made at the Laboratories of The United Gas Improvement Company, Philadelphia.—The question of proper disposal of the products of combustion in gas burning appliances is an important one, as may be seen from the following tests of 2 common types of domestic appliances. Namely, circulating water heaters and room heaters of two types. The water heater chosen was of the size most commonly used for domestic purposes, having a double copper coil, for water, 20 feet long and a gas consumption, when adjusted at a gas pressure of 25/10, of 53 cubic feet per hour. The room heaters examined were a steam radiator with a gas burner of the usual type, and a gas log. The conditions under which the appliances were tested were similar to those which might occur in practice with careless or ignorant consumers.

Water Heaters.—First. The burner, after being properly adjusted, was extinguished and the gas ignited at the burner orifice so that it would burn in the mixing chamber only, a condition similar to that which would occur with the ordinary flashback. A sample of the products of combustion taken from the flue outlet showed the following composition:

	Per Cent.
CO_2	1.3
Ills	0.9
O_2	16.7
CO	3.2[1]

Second. When a flashback occurs, sometimes a quantity of unconsumed gas escapes from the burner which may be lighted and burn at the burner tip. This condition rarely occurs in practice, and a test was made under conditions similar to the previous test, but with the escaping gas lighted at the burner. This was sufficient to give a small flame at the burner tip while some gas was still burning in the mixing tube. Samples of the products of combustion taken from the flue outlet showed the following composition:

	Five Minutes after Lighting. Per Cent.	Ten Minutes after Lighting. Per Cent.
Co_2	7.4	8.2
Ills	0.0	0.0
O_2	10.9	8.9
CO	0.4[1]	0.45[1]

Third.—A piece of tin was placed over the flue outlet of the water heater, which was made in the usual manner, with a serrated edge which allowed a sufficient quantity of the products of combustion to escape without completely smothering the flame. This condition sometimes arises in practice when the consumer either wishes to prevent what he considers an escape of heat, or tries to heat some utensil which he considers it inconvenient to heat in any other way. A sample of the gas taken at the flue outlet showed the following composition:

	Per Cent.
CO_2	5.0
Ills	0.0
O_2	14.1
CO	0.3[1]

Fourth.—The air-shutter was closed so that the primary air to the bunsen was almost entirely cut off.

	Five Minutes after Lighting. Per Cent.	Two Hours after Lighting. Per Cent.	*Five Hours after Lighting. Per Cent.
CO_2	5.2	9.4	11.6
Ills	0.0	0.0	0.1 (?)
O_2	13.9	6.8	1.4
CO	0.5	1.1	3.7

* At this time the coils were very badly carbonized.

Room Heaters.—The steam radiator was adjusted to consume 20 cubic feet of gas per hour; Samples of the products of combustion were collected above the burner head. With the gas ignited at the burner orifice, a condition similar to that which would occur with the ordinary flashback, the products of combustion were as follows:

	Per Cent.
CO_2	0.8
Ills	0.3
O_2	18.0
CO	2.0[1]

Under similar conditions, but lighting the unconsumed gas escaping from the burner tip, the products of combustion were as follows:

	Per Cent.
CO_2	4.6
Ills	0.0
O_2	14.3
CO	0.0[1]

Gas Logs.—The gas log was adjusted to consume 28.2 cubic feet of gas per hour. With gas burning in the mixer chamber only, a condition that would occur with the ordinary flashback, the products of combustion were as follows:

	Per Cent.
CO_2	1.5
Ills	0.5
O_2	16.5
CO	2.8[1]

Under similar conditions, but lighting the unconsumed gas escaping from the log, the products of combustion were as follows:

	Per cent.
CO_2	1.6
Ills	0.0
O_2	18.7
CO	0.2[1]

It will be observed from these tests that, in the case of an ordinary flashback—*i. e.*, the gas burns in a mixing tube and the unconsumed gas is not ignited at the point beyond the mixing tube—that the carbon monoxide content of the undiluted products is relatively high, varying from 2 per cent., in the case of the radiator, to 3.2 per cent. in the case of the water heater. When the gas is flashed back and the unconsumed gas is ignited at a point beyond the mixing tube, the per cent. of the carbon monoxide is much lower, varying from zero, in the case of the radiator, to 0.45 per cent. in the case of the water heater. When the flow of the products of combustion is checked by placing some obstruction in the flue, the percentage of carbon monoxide in the undiluted products is noticeable—in the test made, reaching 0.3 per cent. With the air shutter closed so that there is no primary air admitted, the percentage of carbon monoxide in the undiluted products increases with the length of time, rising from 0.5 per cent. after the burner has been lighted for 5 minutes to 3.7 per cent. after the burner has been lighted for 5 hours.

This latter test was made only with the water heater. The pipe coils became thoroughly covered with carbon, the lower coils being

1 In considering these figures it should be remembered that they represent the composition of the undiluted products as they leave the appliance; these products would, of course, become greatly diluted as they spread into the atmosphere of a room.

1, *Ibid.*

(*Continued on page* 394.)

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NEW YORK, MONDAY, DECEMBER 16, 1912.

BRIEFLY TOLD.

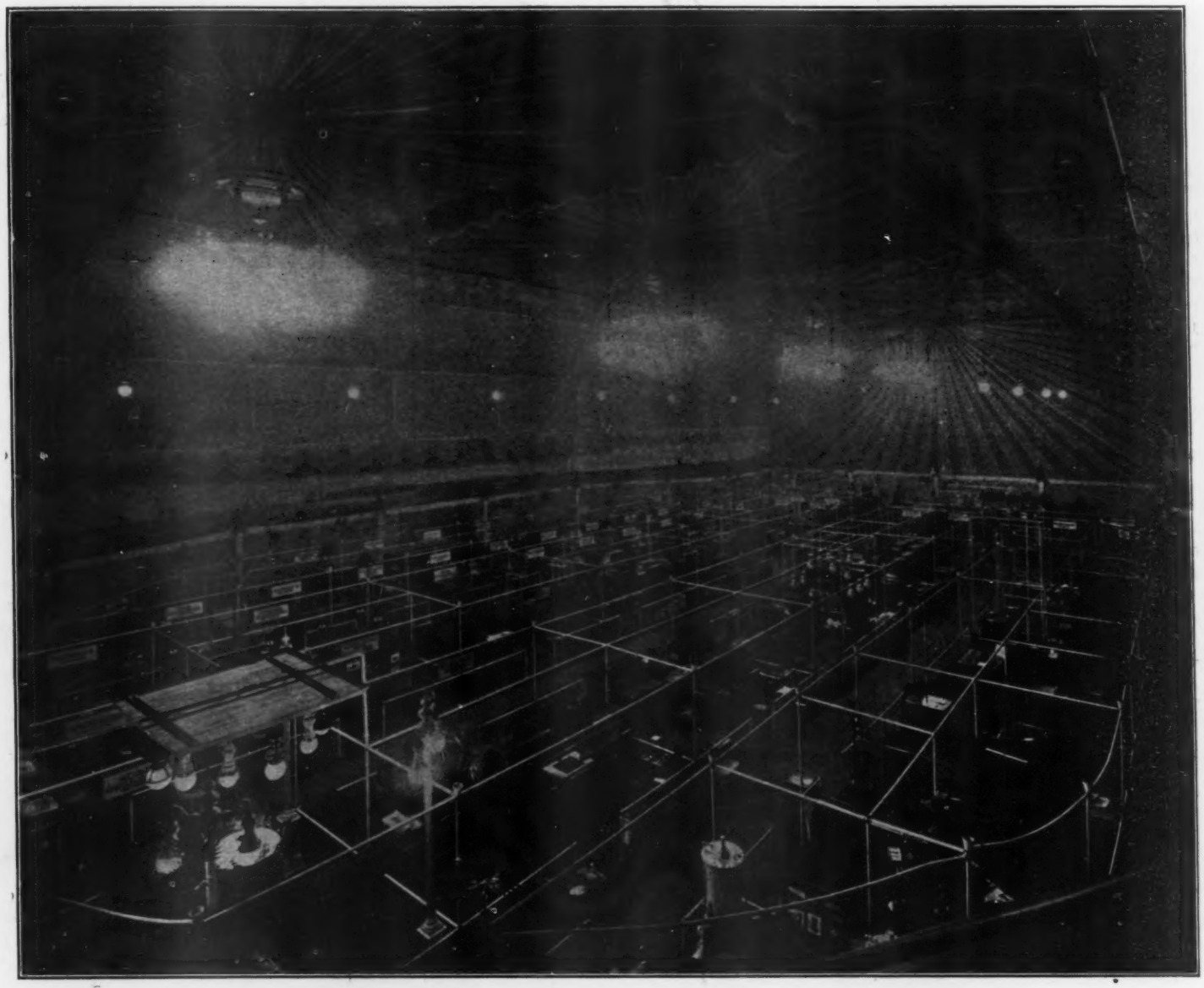
THE FINALE AT ATLANTA.—This is being written just a week after the happenings to be detailed were active, so a bit of color, in the light of time's shading, may show in the recounting. The closing technical session (the South being still far from "sunny") was commenced at 9:30 A.M. of Friday (Dec. 6th), Mr. Oscar H. Fogg, at the invitation of President Holman, presenting the final report of the Committee on "Standardization of Gas Appliances." This report, in every sense a model one, in so far as the routine of the Committee work thereon is shown, led to a fair debate, on the conclusion of which Mr. James P. Hanlan (Newark, N. J.) read a paper recounting his experiences incidental to "Sales Campaigns," several of which have been notably led by himself. Mr. Hanlan's closing speech, in settling the debate, had not more than ended when a center rush was made on Mr. J. C. Rushin, who was in a trice rushed to the front place in the broad Auditorium. There, when the "wedge" had been split, he was told, in the presence of delegates, exhibitors, guests and the rest, how much everyone connected with the gathering was indebted to him; not only so, but further as to how much they thanked him for such indebtedness. He was assured that those for whom he had worked appreciated to the full how fortunate they were in having him serve as *avant courier*, *charge d'affaires*, etc. The poor man (he may not be called a little man in any sense) managed to say that if they were pleased he was repaid, etc. Released from his acknowledgments, business was resumed. The final set number on the technical programme concerned "The Education of Employees," by Dr. Lee Galloway. The discussion on this paper or presentation was lengthy and it was participated in by some who seldom take part in the debates—more's the pity. For instance, the speakers included Messrs. Neff, Ware, Fogg and Robinson. Next came a pleasant interlude. Three Presidents of other Associations were called upon to voice their knowledge as to that which their respective Associations were attempting to accomplish. That clever gas man, who would certainly be a clever representative of any industry—Mr. Arthur Hewitt—responded on behalf of the Canadian Gas Association in fraternal style, again reaffirming the fact that, be else what may, there was genuine reciprocity amongst the gas men. Next in line was our own general representative, in the person of that well-poised, mild-eyed, nevertheless positive director of men, Mr. Walter R. Addicks, President, American Gas Institute. As usual his well modulated expression, complete absence of trick oratory, and connected story of what he hoped would occur in the Institute's affairs, were altogether characteristic of him. And in this listing, although a youngster, no one may truthfully deny the statement tha Mr. C. E. White, President of the Southern Gas Association, and one of the "Doherty Brigade," suffered not a bit in comparison with his older and more prominent associates. A bit of routine measure followed, in the accomplishing of which Mr. C. N. Stannard announced that Mr. C. W. Hare had been selected to represent the Association as its representative to the San Francisco Gas Congress, proposed for 1915. Mr. L. H. Newbert, of San Francisco, responded as the representative of the Pacific Coast Gas Association, and welcomed all to the Queen Metropolis of the extreme West in 1915. Mr. Clabaugh heartily reviewed the social features which had made their stay in Atlanta, Ga., so enjoyable, and Secretary Stotz congratulated the Association that the membership had increased during the convention from 2,760 to 2,950 members, that the total registration, as between members and guests, numbered 787, by quite a register in excess of any theretofore recorded. So ended the technical proceedings.—W.

Dear JOURNAL: "Taft Hall," which all week had echoed to and with the presentation of gentle platitudes, earnest suggestions from and by, or emboldened declarations of and to, the respective things brought out in technical communion, was fittingly the scene of the beefsteak dinner, which also pictured the beginning of the end. The spacious hall speedily took on a well-occupied look when the 30-odd score had trooped in to have a try at the beefsteak dinner. It may have been a beefsteak dinner, but to your scribe it was certainly a banquet of the informal sort. Numbers of the vaudeville type (and one could not be deaf to the comparisons that were made in this respect between Atlanta and Atlantic) were in swift evidence, and that chief of chestnut resurrectionists, "Bill" Guitteau, was in his best voice. Chokingly he announced that, though this was a prohibition State, by the Governor's prescription, stimulants must be served to those who seemed to suffer. How sick they seemed; how quick the remedy acted! Between screen projectors, the impressment of fake newsboys, and some other folderol that was far from being unique, the time passed along with the viands. Indeed, it was not far from midnight when the last name on the speaker's list of speechmakers was sung (that's the word) by Toastmaster Kelley—he began with naming Mr. H. M. Atkinson, Chairman Board of Georgia Railway and Light Company, down to our own absent heavy-weight Editor-in-Chief. Of course, the topics were cleverly treated, and the fact that 13 was the listing seemed not to have any disturbing effect. At any rate, it was 13 o'clock when the assemblage decided it was sufficiently hoarse; yes beyond the aid of "lozengers."

As the end of the time tether was officially set for Saturday, the 7th, the day for the execution of the bull—no, for the consumption of the barbecue—was suffused with the the leaden mist of Southern skies; never a glimpse of sunshine the week through. However, it was required that 12 special trolley cars were necessary to transport the visitors to Grant's Park, the morning of the 7th, determined to be "barbecued" or die. Well, 'tis such a long time between the feast and the day, that it may be shortly here said: The feast was enjoyed, and all lived to speak or shout or lisp a word of thanks to the barbecue, the barbecued and the hosts, whose attentions were simply unbeatable. Now, too, that it is over, the real credit for the home attention, for the unceasing care, for the beautifully administered hospitality, and for the fraternal spirit that animated the "party," should largely go to Mr. R. C. Congdon.—W.

The main illustration herewith gives fairly good idea of the real inmensity of the show of appliances and the arrangement thereof, in connection with the Atlanta meeting of the National Commercial Gas Association. In respect of the "White Way" exterior illumination the citizens were strongly urging that these arrangings be hereafter maintained on city account. Of the four massive chandeliers, of the Humphrey type, that were used in the main lighting of the Auditorium, in Armory Hall, three were sold to the authority Managers of the Hall, for the permanent illumination thereof hereafter. The fourth would also have been accepted were it not for the fact that it was directly over the stage. In this beautiful Hall, for instance, all the reproductions of grand opera, as shown there later in the season, by the Metropolitan (N. Y.) Company, are given. In fact, in this Hall are held all the most important shows and exhibitions that are given to the view of the residents of Atlanta in the course of the year.

NEW JERSEY STATE GAS ASSOCIATION, WINTER MEETING.—The New Jersey State Gas Association will hold its next meeting in Achtel Stetter's Hall, 844 Broad street, Newark, N. J., at 2 P.M., of Wednesday, December 18, 1912. A paper on "House Piping Standards and Their Relation to Architects," is promised by Mr. L. R. Dutton. Mr.



Atlanta Gas Show, December 2-9.—As the birds saw it.

Pennsylvania Globe High Pressure Lamps on the Gilmer Street Side.

Dutton is the Chairman for the Pennsylvania State Gas Association of the Committee having this subject under consideration, and he and the Committee have done a very large amount of work in connection with matters pertaining to the subject. It would look that no one can afford to miss this discussion, which surely is of vital interest to every gas man. The "Gas Meeters" are cordially invited to meet with the New Jerseymen on this occasion. For all of which news we are indebted to the courtesy of Secretary A. H. Osborn.

ANNUAL MEETING, SOCIETY OF GAS LIGHTING.—The annual meeting of the Society of Gas Lighting was held in the Hotel Astor, New York, the afternoon of the 12th inst. There was a good attendance, and the proceedings were largely of a routine nature. The election for office bearers for the ensuing year resulted in these choices:

President.—Col. F. S. Benson.
Vice-President.—Mr. A. H. Strecker.
Treasurer.—Mr. D. D. Flemming.
Secretary.—Mr. George G. Ramsdell.
Member, Executive Committee.—Mr. W. H. Bradley.
Finance Committee.—Messrs. A. H. Elliott, Alfred E. Forstall, George E. Woods.

The annual reports showed that the Society had prospered during the year, and that the average attendance had been excellent. The annual dinner, which was served in the junior banquet room of "The Astor" was a fittingly harmonious sequel to a thoroughly fraternal session.

CURRENT MENTION—

"BULLETIN" No. 112, of the H. M. Byllesby Company, of Chicago, announced that the date of the Company's Employees' Convention, to be held in Chicago, would convene there Friday and Saturday, January 23d and 24th. Well, this was close to the real time, but the days were a trifle misplaced. The meeting will be held in Chicago, Thursday and Friday, January 23d and 24th.

(*Continued from page* 391.)

almost entirely choked, so that there was very little escape for the products of combustion and considerable carbon had dropped to the burner head, clogging the burner orifices.

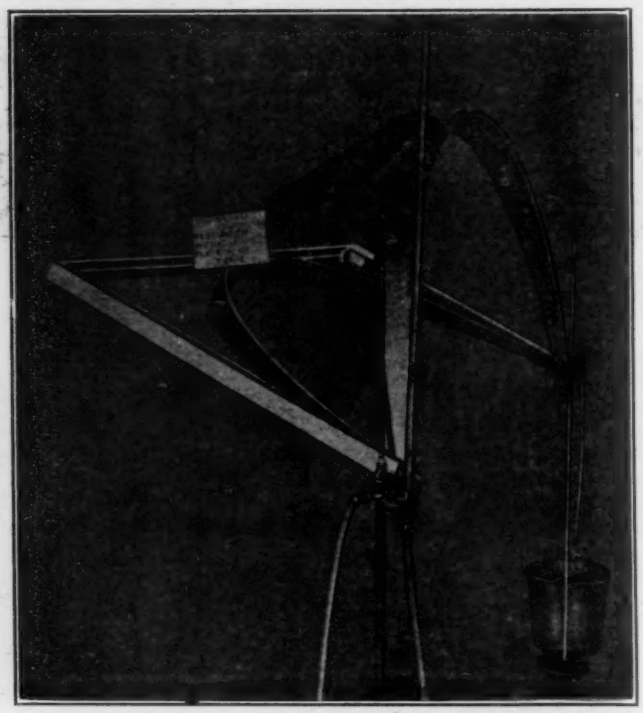
With the burner properly adjusted, and under the condition of the simple flashback; that is, with gas burning in the mixture chamber only, there was but a slight deposit of carbon, but under a similar condition, with the gas burning in the mixing chamber and the unconsumed gas burning at the burner head, there was a considerable deposit of carbon, but not nearly as much (about ½) as when the gas was burning with the air ports closed. In the case of the water heater, anemometer readings were used to determine the quantity of the products of combustion with the burner adjusted under good operating conditions.

With the gas burning at the rate of 50.5 cubic feet per hour, the products of combustion with oxygen alone should be, theoretically, 35.36 cubic feet of carbon dioxide, 49.03 cubic feet of aqueous vapor, 0.31 cubic feet of oxygen, and 2.42 cubic feet of nitrogen; or a total of 87.12 cubic feet.

Assuming the composition of air to be: Oxygen, 20.9 per cent., nitrogen, 79.1 per cent., for theoretically perfect combustion, there would be used 247.137 cubic feet of air, of which 51.652 cubic feet would be oxygen and 195.485 cubic feet would be nitrogen. The 51.652 cubic feet of oxygen are included in the 87.12 cubic feet of the products of combustion of the gas, so that the total volume of the product of combustion should be 87.12 cubic feet from the combination of the gas and oxygen, plus 195.485 cubic feet of inert nitrogen, or a total volume of products of combustion of 282.605 cubic feet.

The volume of the products of combustion measured by the anemometer was 399 cubic feet. Subtracting from this figure 282.605, there is a discrepancy of 116.395 cubic feet, which we may assume is the excess of air in the products of combustion above what is necessary for complete combustion, or 41 per cent.

It is to be noted that the accuracy of these figures depends on the

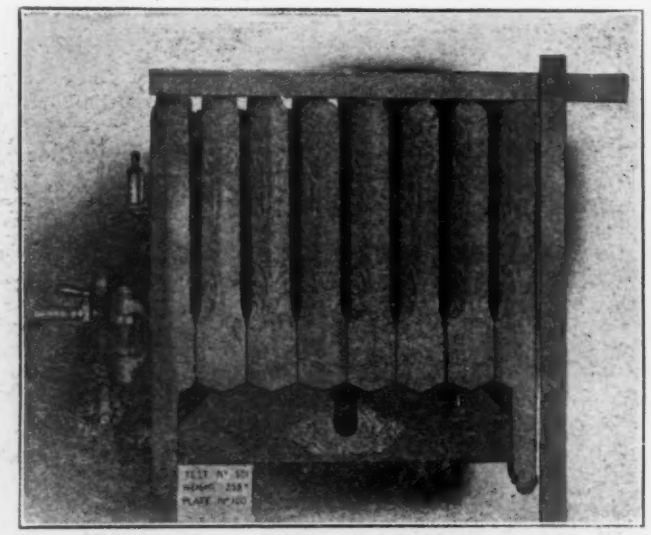


Photograph No. 1.—Exhibit "C."

readings made with the anemometer under such conditions as militate against accuracy. In order to verify certain of the carbon monoxide figures, the Vogel blood test was applied, and indicated apparent accuracy of the readings.

Exhibit C.—Radiant Heat from Blue Flame and Luminous Flame Heaters.

Test Made at the Photometrical Laboratory of The United Gas Improvement Company, Philadelphia.—The object of this test was to compare the efficiencies of various types of heaters, considering only the radiant heat. Neither heat of convection nor heat of conduction was measured, nor was any examination made of the quantity and composition of the products of combustion. Because of lack of time, these appliances were all tested when new, and no allowance was made for depreciation during use, a factor which undoubtedly would be of considerable moment. The heaters used for this test were all of familiar types as described and illustrated:



Photograph No. 2.—Exhibit "C."

No. 1 was a heater of the steam, or hot water, cast iron radiator type, the radiator containing water heated by an atmospheric burner beneath. No. 2 was a heater of the incandescent fuel type, the fuel

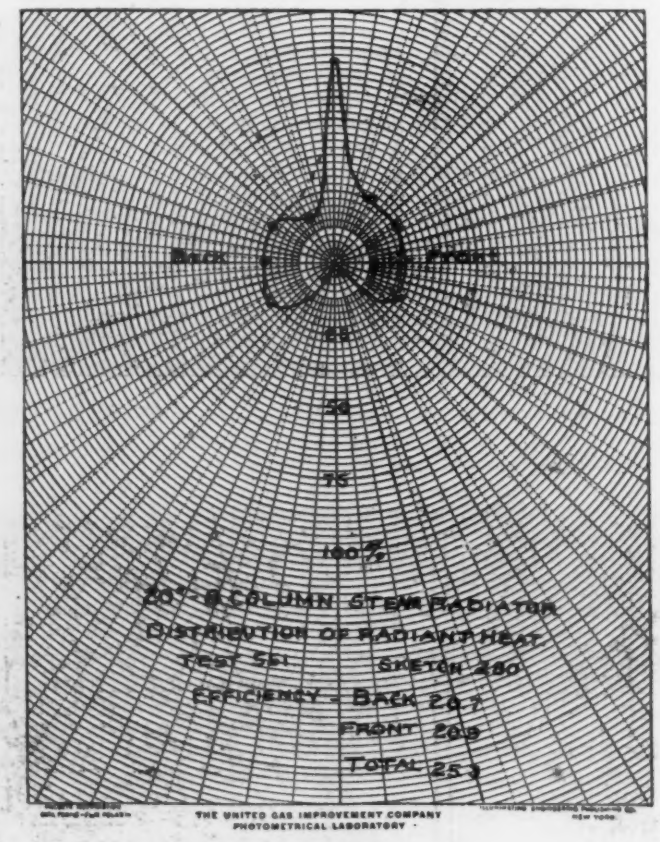
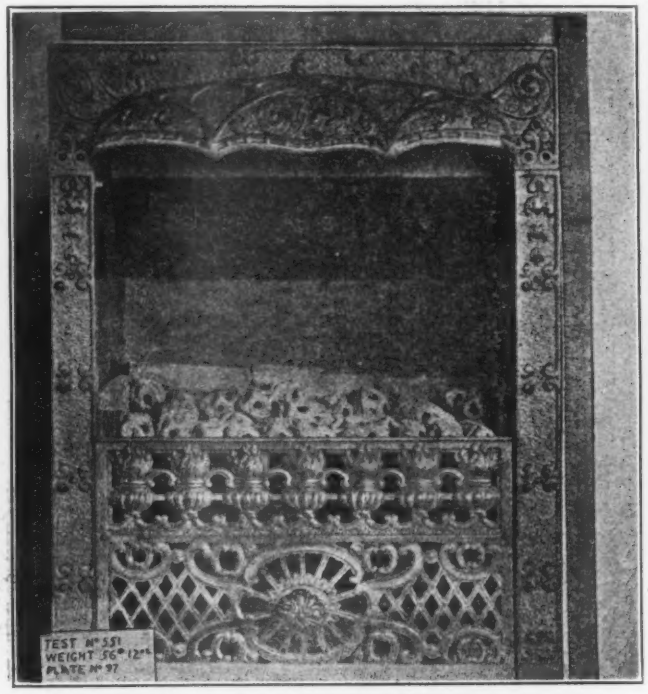


Fig 1.

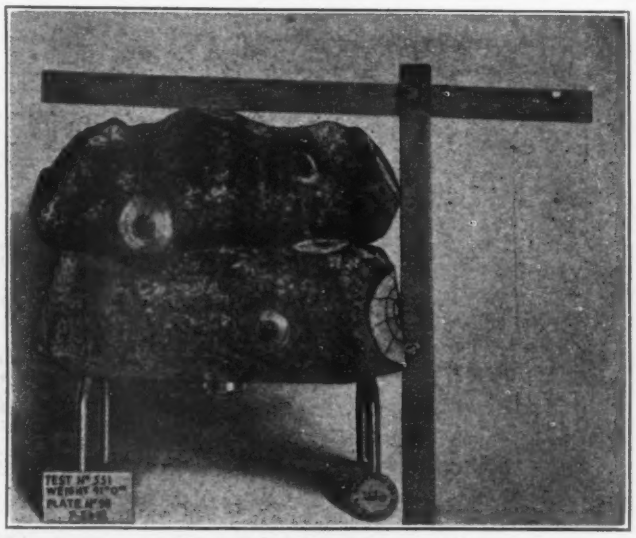
(hollow balls of refractory material) being heated by an atmospheric burner on which they were placed. This heater was designed for use with natural gas, and satisfactory combustion with low pressure manufactured gas was impossible. With a properly designed burner, a higher efficiency is to be expected.

No. 3 was a heater of the gas log type, the logs being made of refractory material on which was placed a small amount of fiber asbestos. Holes in the logs served as burner orifices, and the refractory material of the logs and the asbestos were heated by these flames. This heater was equipped with an atmospheric burner.

No. 4 was a heater of the fireplace type, made of a perforated metal back, covered with fiber asbestos, the asbestos being heated to a high degree of luminosity by the atmospheric flames from the perforations in the metal back.



Photograph No. 3.—Exhibit "C."



Photograph No. 4.—Exhibit "C."

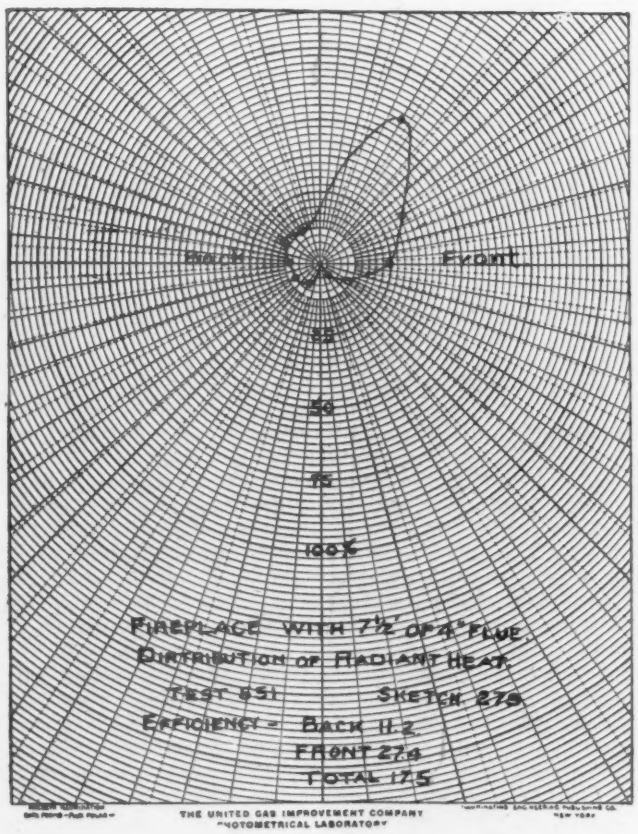


Fig. 2.

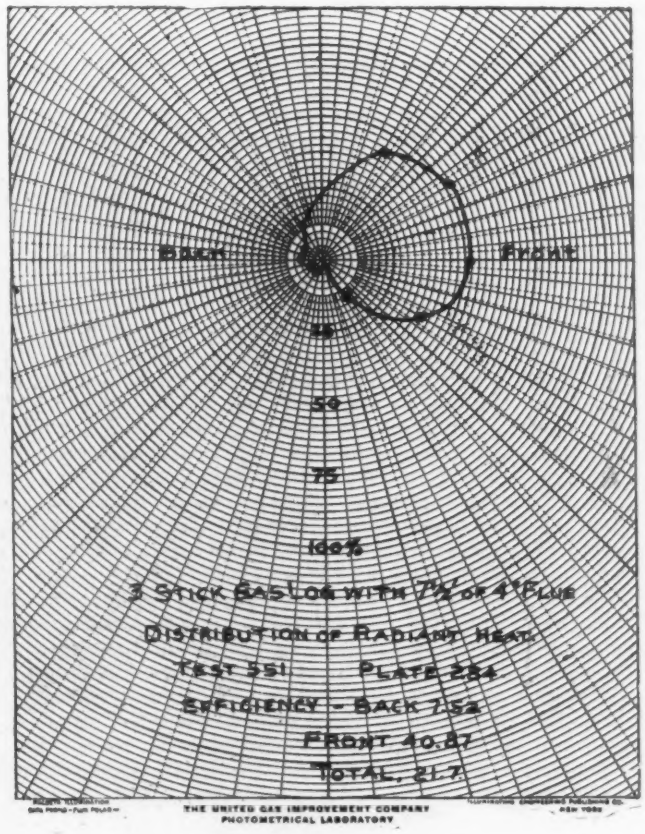


Fig. 3.

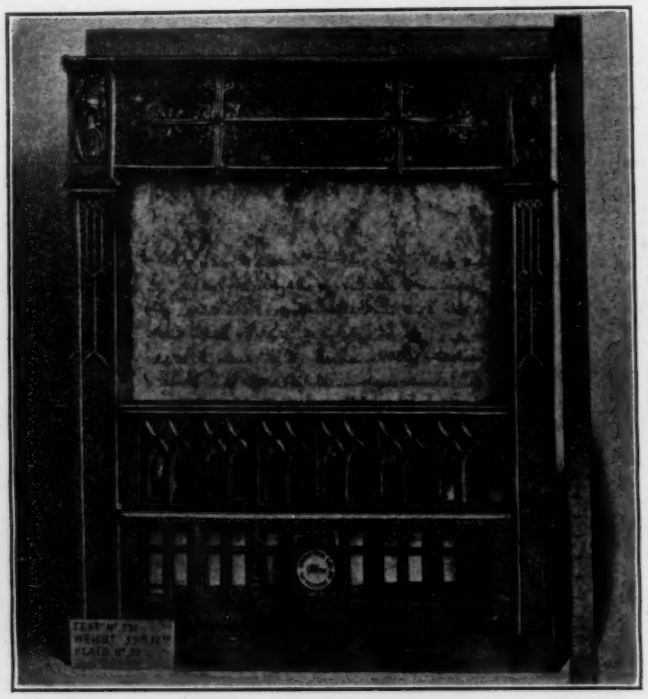
No. 5 was a heater of the reflecting type, a polished back of copper reflecting the heat of the luminous flames from lava tips in the top of the heater.

No. 6 was a heater of the radiator type, the radiator made of sheet iron tubes, with luminous flames from lava tips at the bottom and inside of each tube.

No.	Type.	Efficiency.	Character of Flame.
1.	Hot water radiator	25.30	Atmospheric.
2.	Artificial fuel heater	17.50	"
3.	Gas log	21.70	"
4.	Asbestos fire back	57.70	"
5.	Reflector heater	25.94	Luminous.
6.	Luminous flame radiator	27.30	"

This test shows no material difference in efficiency between the blue flame and luminous flame heaters, but seems to indicate that better results may be expected from luminous heaters, the luminosity being either of the flame itself or of material made luminous by the flame. As the efficiencies obtained appear to be lower than those obtained in the tests made by Mr. Clark, in England, it seems advisable to experiment with heaters similar to the asbestos fireback, but made of such materials that the depreciation will be less than when fiber asbestos is used, and so designed as not to be subject to the objectionable feature of imperfect combustion, referred to in the body of this report.

The Procedure of the Test was as Follows.—After considerable discussion, the calorimetric method of testing was adopted and a calorimeter improvised for the purpose. This had the advantage of simplicity and directness of measurement, and it is thought the results secured are accurate enough for commercial testing. The design of apparatus used is an elaboration of some work done in England by Mr. J. G. Clark, and reported in the *Journal of Gas Lighting*, April 26th, 1910. The work done there was not complete enough for the purpose of this test, in that only a portion of the space around a stove was explored. The total radiating efficiency was, therefore,



Photograph No. 5.—Exhibit "C."

Photograph No 6.—Exhibit "C."

indeterminate. The calorimeter designed and used in this test is shown in Photograph Plate No. 1. It is merely a lune of blackened sheet copper, 0.005 inch thick, maximum width, $3\frac{1}{16}$ inches, the circle being 58 inches diameter, backed by a lune of heavier, bright, copper uniformly $\frac{1}{4}$ inch narrower, and separated from it by about $\frac{1}{8}$ inch so as to allow water to flow through the space formed. The ends were then joined to $\frac{1}{4}$ inch brass pipes to allow influx and efflux of water, fitted with unions to allow the apparatus to swing and cover the imaginary sphere out of which it was cut. The metal was so cut that nothing but blackened surface presented itself to the radiation, the edges of the apparatus being beveled to an angle of 135° instead of 90°. Close to the unions were placed $\frac{1}{10}$° C, thermometers to measure the ingoing and outgoing water temperatures. One inch inside of this blackened surface was placed a screen of bright tin, uniformly 1 inch wider, and having the edges turned over $\frac{1}{4}$ inch at an angle of 90°.

The stove being properly set in the center of the imaginary sphere, the blackened surface is presented to the radiation and the temperatures of the ingoing and outgoing water noted every 2 minutes for 10 minutes, together with the amount of water that is flowing through. Then the screen is placed in front and the readings repeated, the true radiation being taken as a difference. In this way the influence of room temperature, convected heat and other possible sources are reduced to a minimum. It is desirable that the room in which the test is made shall be free from pronounced draughts; the temperature of the ingoing water should be constant, or change only very slowly (if possible not more than $\frac{1}{10}$° C. in 3 or 4 minutes), and the tests run with sufficient slowness to insure equilibrium.

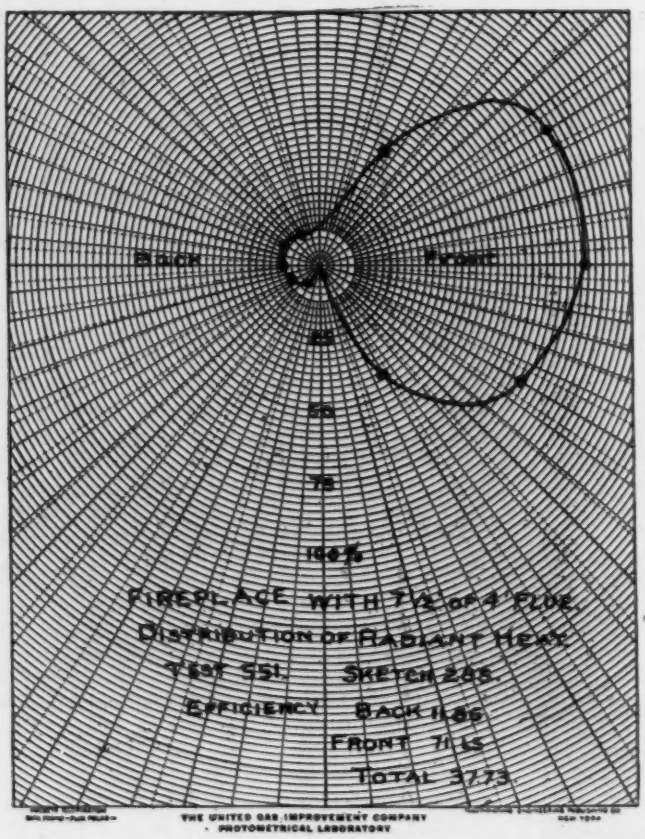


Fig. 4.

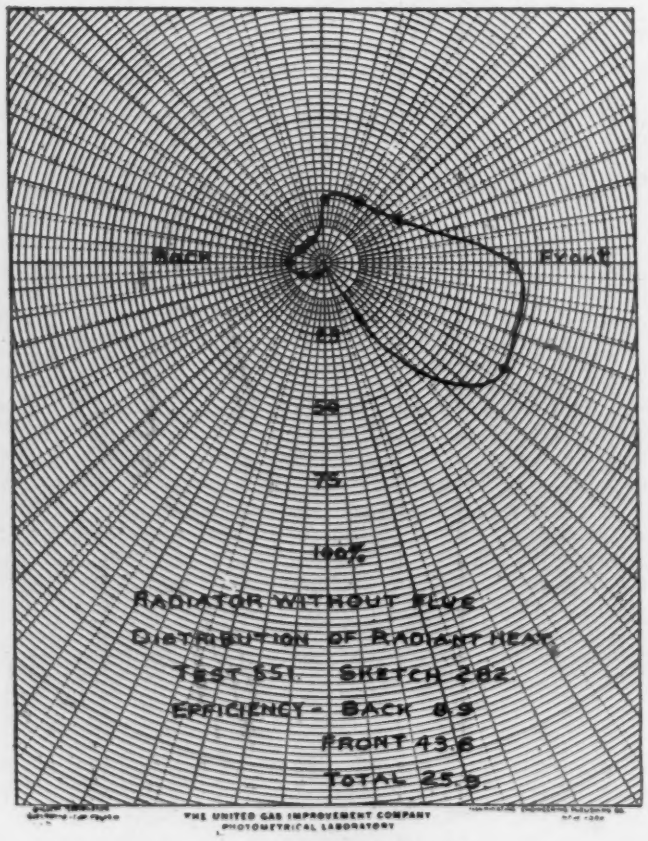
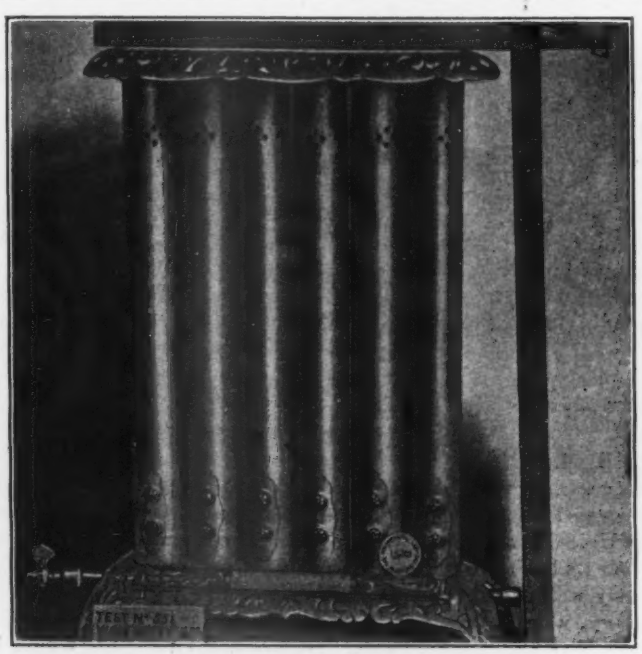


Fig. 5.



Photograph No. 7.—Exhibit "C."

Any one setting of the calorimeter covered $\frac{1/58 \times \pi}{3.063} = 1/59.4$th part of the whole sphere. Therefore, the amount of heat received on the surface, multiplied by 59.4, and divided by the amount of heat generated by the radiator under test in same time, gives the radiant efficiency, on the assumption that the radiation in all other directions is the same as at the one setting of the instrument. This is the unit

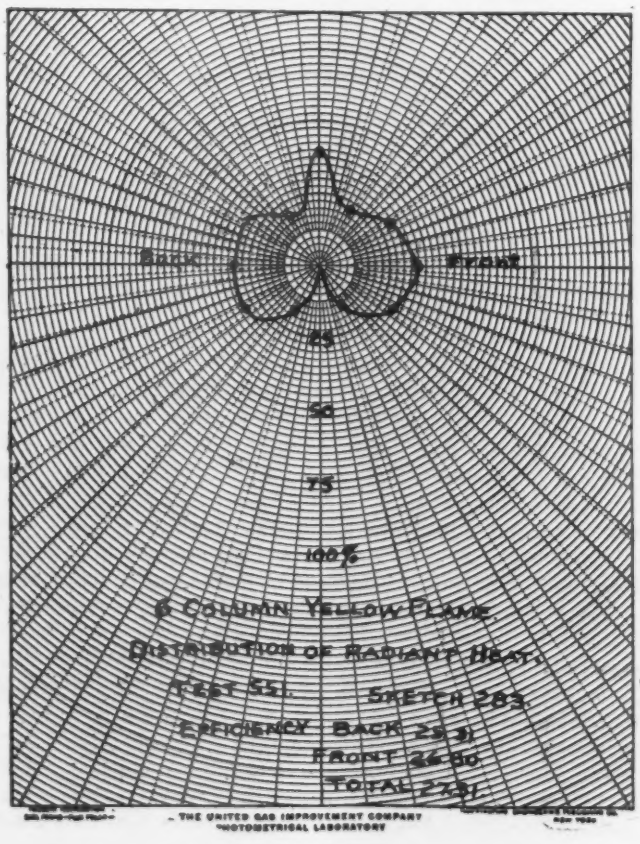


Fig 6.

used throughout the test results, being of convenient magnitude, and varying in different directions by suitable amounts, and the radiant efficiency all around is simply an average. This divided by 59.4 is, then, the percentage of the total heat generated that is actually radiated in anyone position. Readings are taken every 30° around a heater, except directly beneath. At 30° on each side of a line drawn perpendicular, directly beneath a heater, the efficiencies uniformly run so low that it does not seem worth while to attempt to measure them. Therefore, in taking an average this position is excluded in all results.

(To be Continued.)

Natural Gas in Ohio During 1911.

No. 85 "Bulletin," U. S. Geological Survey, declares that the natural gas industry of the United States prospered in 1911, as shown by the fact that the total quantity produced was practically the same as in 1910, while the value increased from $70,756,158 to $74,127,534, a gain in value of 4.76 per cent.

The conditions of production were particularly interesting in Ohio, where three natural gas zones are recognized, the distinctions being important, particularly as the great decline in the northwestern Ohio or "Trenton" field has been compensated to a considerable extent by the rapid development of the Clinton or central-Ohio field. The third field is in southeastern Ohio and yields besides gas the light oil of "Pennsylvania grade." The earliest of these fields to be developed was that of northwestern-Ohio, where the gas originally found at Findlay furnished the second important field in the industrial development that followed the application of natural gas in manufacturing enterprises.

Gas was discovered at Lancaster in 1887, and further discoveries followed rapidly until the territory developed into one of the finest gas regions in the country. Moreover, the regularity of the gas sand led to comparatively easy prospecting. The rock structure is fairly simple. In the region of the Bremen field, Fairfield county, the dip is about 57 feet to the mile, with some small rolls having a reverse dip. West of this region the sand thins and disappears before the longitude of the middle of the State is reached, its place being taken by shales. The great reservoirs of gas are usually found near the western margin of the sand, the oil existing at greater depths to the east.

The last report recently issued by the United States Geological Survey shows that 1911 was one of the best in the history of the natural gas business in Ohio. The central-Ohio district, which comprises chiefly the counties of Licking, Knox, Hocking, Fairfield and Ashland, was actively developed and extended northward into Lorain and Medina counties, many remarkable wells having been discovered, particularly in Ashland county. At the end of the year many of the completed wells were closed in for future use. It is reported that the pressure in the older gas fields of this State is gradually being reduced. In the Homer field, including Knox and Licking counties, the average pressure decreased from 207 pounds in December, 1910, to 180 pounds in December, 1911; in the Sugar Grove field, including Fairfield and Hocking counties, the average pressure decreased from 125 pounds in December, 1910, to 92 pounds in December, 1911. In the new Ashland-Lorain field, however, including Ashland, Medina, Richland, Lorain and Wayne counties, the average pressure increased from 663 pounds in December, 1910, to 770 pounds in December, 1911, owing to the opening of new territory. As a consumer of gas in 1911 Ohio takes second place, having consumed 112,123,029,000 cubic feet, valued at $22,792,270, an average price of 20.33 cents per 1,000 cubic feet. Ohio consumed more gas for domestic purposes than any other State in 1911, the total domestic consumption being 57,791,210,000 cubic feet, valued at $15,837,421, an average price of 27.40 cents. The number of domestic consumers supplied increased from 475,505 in 1910 to 577,263 in 1911. The total quantity of gas produced in this State in 1911 was 49,449,749,000 cubic feet, valued at $9,367,347 compared with 48,232,406,000 cubic feet, valued at $8,626,954, in 1910. The difference between the gas produced and that consumed in Ohio shows the quantity piped into the State from West Virginia and Pennsylvania. The number of gas wells in this State at the close of 1911 remained the same as at the close of 1910, 450 gas wells having been completed and 450 gas wells abandoned during the year. The number of dry holes drilled in 1911 was 191.

West Virginia Leads the Producers.

The output of natural gas in West Virginia, for the year 1911, as per U. S. Geological Survey Bulletin, No. 80, West Virginia is the greatest producer of natural gas in the United States. The product from her wells in that twelvemonth was double that from the wells of any other State; and, in fact, it amounted to ⅓ less the output of the entire country. The Survey figures declare that in 1911 the enormous volume of 207,112,576,000 cubic feet of gas, valued at $28,451,907, as compared with 190,705,869,000 cubic feet, valued at $23,816,533, in 1910. Natural gas accompanies the oil in the wells of West Virginia even more regularly than in Pennsylvania, and the sands yielding gas without oil are more extensive, so that while the

State consumed 80,868,645,000 cubic feet of gas in 1911, it also exported a large quantity to Pennsylvania, to the lake shore in Ohio, to Maryland, and to Kentucky. In order to supply the necessary quantity for Pittsburgh the gas is pumped through the lines at an average rate of 42 miles an hour, and occasionally at as great a speed as a mile a minute.

Drilling was active throughout the State in 1911, resulting in the completion of 870 productive gas wells out of a total of 987 wells drilled, the number of gas wells at the close of the year being 4,755 as compared with 4,052 wells at the beginning of the year. Fifteen years ago there were only 840 natural gas wells in the State and the value of the output was less than $1,000,000.

The quantity and value of the gas consumed in West Virginia in 1911 amounted to 80,868,645,000 cubic feet, valued at $6,240,152, an average price of 7.72 cents per 1,000 cubic feet. Of the total consumption in 1911 a larger proportion was consumed for industrial than for domestic purposes. The quantity of gas consumed in manufacturing was 50,130,046,000 cubic feet.

One of the industries which is almost entirely confined to this State is the manufacture of carbon black, for which large quantities of gas are required and to which the gas is well adapted. It is estimated that during the year 1911 a total of 18,737,265,000 cubic feet of gas was used by the carbon black factories of West Virginia. The value of this gas was $544,856, an average of about 3 cents per 1,000 cubic feet.

Recent Patent Issues.

Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,045,829. Gas Burning Furnace. G. L. Fogler, Pittsburgh, Pa.

1,045,874. Gas Lighting Device. T. S. Newman, Newton, Mass.

1,045,940. Gas Heated Oven. J. A. Buckwalter, Royersford, Pa., assignor to Buckwalter Stove Company, same place.

1,046,025. Gas Lighter. H. Rottersmann, St. Louis, Mo.

1,046,269. Mantle Sewing Machine. S. Cohn, New York City, assignor, by mesne assignments, to Mantle Machinery and Patents Company.

1.046,270. Manufacture of Gas Mantles. S. Cohn, New York City, assignor to Mantle Machinery and Patents Company.

Items of Interest
FROM VARIOUS LOCALITIES.

Mr. K. G. Martin, of the Central Foundry Company, New York city, informs us that the Company has put out another series of "booklets" respecting its wares. Write to him for a set at his address, 90 West street, city.

We are again reminded, through the receipt recently from the U. G. I. Company, of literature descriptive of efficient "First Aid for Persons Overcome by Gas." This compilation and assortment of things necessary to the speedy relief of sufferers from or through gas asphyxiation are the products of years of practical experience, in which hundreds of cases were treated. The Company's first aid equipment consists of "Standard Cabinet," for general emergency use; "Two Metal Kits or Boxes," fitted up for cases of gas asphyxiation or electric shock; "Leather Pocket Kit," for use in like cases. Each cabinet or kit contains a booklet, well illustrated with cuts depicting methods of treatment and carrying explicit directions for the use of the contents of the kit. The prices of these outfits are of the lowest possible figure, the Company seeking only a return that will reimburse it for getting the outfits together.

"V. R. R.," who writes from Washington, D. C., under date of the 7th inst., is informed that the Messrs. R. H. and L. R. Dutton sold their holdings in the Hanover (Pa.) Gas Company, to Mr. Howard E. Young and associates of Hanover, the transfer taking practical effect the first week in November. Mr. R. H. Dutton is temporarily making his home in West Chester, Pa., and Mr. Young has retained the services of Mr. J. Vanden Bout (formerly of Williamsport, Pa.) to operate the Hanover system. During the Dutton regime—they succeeded Mr. F. H. Shelton and associates in ownership in 1905, and the Shelton organization controlled it between 1900 and 1905—they cleverly raised the output from 12 millions cubic feet to virtually 35 millions cubic feet at the present time.

We are in receipt of a copy of the December issue of the "Vulcan Bulletin," from the press of the William M. Crane Company, which is more than ordinarily interesting. In fact, Editor Brooks evidently set a high mark for his Christmas number, and the result is a production of interest to gas companies and to their customers, and of value to the Crane Company as well. By all means, secure a copy (or copies) of it, which may be obtained on request, at the headquarters, 16 to 20 West 32d street, city.

The H. M. Byllesby Company's current weekly (Dec. 5th) "Bulletin" is certainly a remarkable roster; and also positively proves that this enterprising concern is covering more space on the business map of the United States as the years go on—the current year, by-the-way, is by far its busiest year. One item within its covers that reads particularly well is from President Dover, of the Tacoma (Wash.) Gas Company, who, discussing the positive success of the Tacoma Company's "Gas Educational Club," remarks: "This Club, which was established here last March, has been successful beyond the expectations of its officers and the members of the Company. The interest taken in the Club's proceedings resulted in large attendance at their weekly meetings, and the original quarters of the Club have for some time been inadequate. The Club, the first week in December, moved into its new quarters, located on the second floor of the Carlton Hotel, where, in fine apartments, the membership may and do enjoy the up-to-date appointments and conveniences thereof. The removal to the new quarters was punctuated by the payment of every up-to-them indebtedness, so the housewarming was had in the pleasing knowledge that the debit side of the ledger was beautifully blank; not only so, but that a comfortable cash balance was checked to credit. The Club now has an even 100 members, and not a delinquent in respect of dues to the 1st inst. The new rooms have a pool table, and either a piano or Victrola will be added in short time. Adjoining the Club room proper is a large room available for meetings, and also for the use of a Balopticon machine. Of course, the elegant writing rooms of the hotel proper which adjoin are available for use by Club's members. Several special social events are in course of arranging for the current winter season, possibly the most important of these being a ball and banquet, some time during the holiday weeks."

"Gas Club," writing from Burlington, Vt., under date of the 6th inst., says: "A most successful meeting of the Employees' Club, of the Burlington (Vt.) Light and Power Company, was brought off the evening of the 6th inst. Well over 50 were in attendance. The 'feature' of the evening, as it was facetiously termed, was 'Charlie' Blood and his 'trained' arc lights. Mr. Blood's lecture was chiefly concerned in respect of getting new business with the Humphry arcs. The lecture was illustrated by means of intelligently handled slides (considerably over 100 of which were shown) reproducing installations now doing satisfactory work in all sections of the country."

The official figures returned to the United States Geological Survey, respecting the output of natural gas in New York State in 1911, show these interesting figures: It is found in 15 counties in profitable paying quantities, and is encountered in several other counties. In 1897, the wells numbered, 359; in 1911, the number was 1,528. The estimated volume of gas consumed in New York during 1911, amounted to 14,894,303,000 cubic feet, and its average value per 1,000 was 28.71 cents—of this the value of gas piped from Pennsylvania into New York amounted to $2,857,557.

Strange-to-say, certain residents of Lawrence, Mass., have petitioned the Board of Gas and Electric Light Commissioners to call a public hearing, the object of which is to cause the Lawrence Gas Company to reduce its selling rate to 80 cents per 1,000 cubic feet. The present net rate to ordinary consumers is 90 cents per 1,000, and likely no better service is carried on by any other Company in the country. So, in view of these matters of record, and in the further recollection that labor troubles were rampant this year in Lawrence,

caused a great monetary loss to the Company, it would seem a most inappropriate time to urge a reduction of the nature contemplated. It may be said the cut of 10 cents per 1,000 is a small one; but if you put it through a percentage trial the result (a difference of fully 11 per cent.) is a decidedly large one. The increasing cost of oil as an enricher has reached a most serious height, in fact a height that of a certainty must result in the curtailment of the manufacture of water gas; but meanwhile the gentlemen who adjust the figures, mainly resident of 26 Broadway, are declaring that oil prices are as low as they can consistently be put. However that may be, 26 Broadway cannot declare that the material that is now being furnished for gas making purposes is within 50 per cent. of the value as a gas producer of the oil that so sold 10 years ago, whereas the price of the present material will average 100 per cent. over the average of 1902.

MR. ARTHUR D. SNOW, who was "let out" of his position as bookkeeper for the Holyoke (Mass.) City gas supply, by Mayor John J. White, has been appointed to a responsible place on the staff of the Massachusetts Board of Gas and Electric Light Commissioners. Mr. W. A. Bennett, who succeeded Mr. Snow in the Holyoke job, by-the-way, proposes "to inaugurate a series of reforms" in the bookkeeping methods of the department.

THE New Britain (Conn.) Gas Light Company will have a new purifying house. It will be a cement and brick structure, 35 feet by 85 feet, by 35 feet high, and is to have a steel truss roof, the covering material to be of asbestos. The plans are by Mr. W. H. Cadwell.

"B. G. R.," writing from Montreal, Quebec, under date of December 3d, says: The Town Council, of Cornwall, has entered into a contract with the Stormont Electric Light and Power Company, for the supplying of gas and electric light for a period of 10 years, subject to a readjustment of rates at the end of 5 years, if the conditions should warrant it. The agreement contains nothing that could prevent another plant being established in Cornwall at any time to compete with the present Company Under the new contract the town is to have a greatly improved system of street lighting at a reduction of $750 per year. The gas rates have also been reduced, the net price to be $1.12½ for cooking and heating, and $1.50 for illuminating purposes. There will be no monthly or weekly charge for meters on either gas or electric account. The by-law to confirm the contract is to be voted on by the ratepayers, Monday, December 23d.

JONESBORO, ARK., has determined to have a gas works, a franchise for that utility having been granted to Messrs. W. T. Lane and E. E. Randolph. These gentlemen are solvent, responsible, and business men. The former is Cashier of the Bank of Jonesboro; and Mr. Randolph is Manager of the Pekin Stave Company.

THE Elgin (Ills.) contention over the gas supply has been settled, the people having ratified the agreement between the authorities and the Western United Gas and Electric Company, by special election; so here's hats off to Congressman Ira C. Copley. The main features of the franchise are: Duration, 20 years; compensation to be paid the city, $27,000; gas rate, commencing Jan. prox., 95 cents per 1,000; for each 5-year period, beginning Jan. 1, 1918, the rate to be arrived at by arbitration; regulation of purity, pressure, inspection of gas and gas meters; a minimum charge of 50 cents per meter per month, in case the consumption of gas used in the month fails to reach that value; no patron of the Company, save manufacturing concerns, may be favored by special rates; at any time during the life of the franchise the city can purchase the Company's property by giving 1 year's notice; as much of the cash bonus of $25,000 as necessary is to be used for the creation of a standpipe on the west side of the river.

MR. CHARLES F. PRICHARD, Vice-President and General Manager of the Lynn (Mass.) Gas and Electric Company, the night of the 4th inst., in Burdett Hall, Lynn, delivered a most interesting lecture on "Gas: Its Manufacture, Uses and Possibilities." The lecture was primarily intended for the Lynn members of the American Institute of Electrical Engineers; but many prominent residents, not identified with either industry as manufacturers, were present. Over 100 slides were shown illustrative of the text, and when it is said that the speaker was at his best, enough is said to show that the audience was entertained to the utmost.

MR. R. G. GRISWOLD, Chief Engineer, gas division, Denver (Col.) Gas and Electric Light Company, has been drafted by the H. L. Doherty Company, to a much more important position in the Company's engineering section. If we mistake not, Mr. Griswold's headquarters are to be in New York.

WE are in receipt of a copy of a very handsome calendar, gotten up by the Brown Instrument Company, of Philadelphia, Pa. It is a gem, and well worthy of a prominent placing in anyone's office. Should you care for a copy without charge, just address your inquiry to Mr. R. P. Brown, President, Brown Instrument Company, Philadelphia.

WE regret to have to record the death of Mr. W. S. Reger, Superintendent of Mains, Granite City (Mo.) Gas Light and Fuel Company, who passed away, at St. Elizabeth's Hospital, Granite City, the night of December 1st. Deceased had been a resident of Granite City only a short time, having been put in charge at Granite City late in November. Prior to that (since May, 1882) he had been in the employment of the Laclede Gas Company, of St. Louis. He was in his 56th year, and his death was due to a startlingly quick cerebral hemorrhage, being engaged on the line when the attack came. Hence his removal to and death in St. Elizabeth's. He is survived by his widow and one daughter, Mr. J. L. McGraw, wife of the Business Manager of the Granite City Company.

"THE Committee in charge of the recent celebration of Columbus Day in North Adams, Mass., has presented to the Italian Parochial School 2 silk flags in recognition of the School's participation in the parade. The American flag was the gift of Mr. B. K. Cook, Manager, North Adams Gas Light Company. The Italian flag was purchased by the Committee for the School.—B. P."

"I THOUGHT it would be of news to some of your readers, noticing as, I have, during my travels that the JOURNAL is often in the hands of members of the weaker sex, notably the Secretaries or stenographers of the engineers or officers of the Companies, that Mr. Guilbert Harris, Manager of the selling division of the Spokane (Wash.) Gas Company, is no longer a bachelor, he having persuaded Miss Anna Doherty that a change of name would be in line with his future happiness. The wedding service was performed in the Church of Our Lady of Lourdes, the afternoon of the 22d ult., the Rev. Father Verhagen officiating. After the wedding a supper was served at 'Davenports,' and everything moved as smoothly as harmony could master. The young folks are to make their home in E 1712 Eleventh avenue, Spokane; and may they ever happy be.—F. T. M."

ANOTHER happening next of kin to the above is sent by "Hardy," from Winthrop, Mass., under date of 2d inst.: "Miss Josie A. Kennedy, since 1910 connected with the business division of the Revere station, Suburban Gas and Electric Company, Boston, resigned from the service something over a fortnight ago, The cause of the severance may be inferred when I mention that just prior to her going away the employees of the Company (rank-and-file) presented her with a beautiful dinner set of Haviland china, and Manager Chisholm next gave her, on behalf of the executive force, a pretty purse laden with gold pieces well over $60 in value. Miss Kennedy's best man didn't even get a vote of thanks."

THE contracts for the construction of the buildings for the gas plant at Brenham, Tex., have been let to Mr. J. M. Hyde. The contractor has been notified to proceed with all speed possible.

MR. ALFRED R. THACKERAY, formerly on the staff of the New Bedford (Mass.) Gas and Edison Light Company, resigned therefrom to act as sales' agent for the Adder Machine Company.

"B. B. T," writing to us from Bridgeton, N. J., under date of the 5th inst., incloses this: "The merchants doing business in our downtown district not long ago entered into an agreement with the Bridgeton Gas Light Company, and the evening of the 2d inst. the fruition of the planning was realized. The scheming had for its base the placing of 100 gas arcs (Humphry type) installed at the proper heights and locations on the store fronts, in the show windows and on the curb lines. In fact, wherever such lighting units could be suitably used. The hours of lighting are: Saturday, 5:30 P.M. to 11 P.M.; other days, 5:30 P.M. to 10 P.M. The Gas Company does the lighting and extinguishing.

The Market for Gas Securities.

Consolidated gas kept pace with the balance of its up-and-downs on the Exchange list. To-day, however, fatal as are its figures (Friday, the 13th) in the belief cabalistic, it seems that the end of the scare is at hand. The net loss for the week is 1½ points in the bid, which came in this morning at 138½ to 139. Quite a lot of the stock was taken in during the week below 138. Money rates are still disturbed; but such happenings always occur during the times that half yearly disbursements on dividend account call for heavy cash assemblings.

Brooklyn Union is nominally 3 points under the bid of a week ago, but this security has held its own remarkably well. This morning it was 138 to 144. In out-of-town shares the feature was Washington (D. C.), which scored a rapid advance of 7 points, to 427½ bid. Peoples, of Chicago, is at the tempting figures of 111½ to 111¾, and Lacledes (both common and preferred) also look inviting—the former especially at 103. The market for gas bonds continues good. The regular quarterly dividend (2 per cent.) has been declared on the shares of the United Gas Improvement Company. It is payable Jan. 15th.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

DECEMBER 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	138⅝	139
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	103	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,500,000	100	152	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	101	102½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	99½	101
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	138	144
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	999,650	500	180	—
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅝
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	85
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,036,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Detroit City Gas Co.	6,580,000	—	—	50
Detroit Gas Co., 5's	881,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	138
" Bonds, 5's	10,500,000	—	101	106
Indianapolis	2,000,000	—	38	45
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	91	95
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	98½	99
Laclede Gas Co., St. Louis.	10,000,000	100	103	103½
Preferred	2,500,006	100	99	102
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	130
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	90½	91¼
Preferred	25,000,000	100	94	95
Montreal Gas Co., Canada	2,000,000	100	228	229
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	182	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	111¼	111⅜
1st Mortgage	20,100,000	1,000	103	103½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104⅜	105½
Pacific Gas and Electric Co.	15,500,000	—	64⅜	65
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	427½	430
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 15-17, 1913. Officers: President, W. R. Addicks, New York City. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting Sept. 1913. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 8, 1913. Officers: President, C. G. M. Thomas, Long Island City, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gas Meters.—Next Meeting, Newark, Dec. 18; Chairman, Will W. Barnes; Commissioners, W. H. Pettes, I. W. Pefly: Secretary, H Thurston Owens, 42 Pine street, New York City. Philadelphia Section; Chairman, L. R. Dutton; Commissioners, S. Grady, H. P. Dains: Secretary, H. F. Patterson, Jr., 831 Chestnut street.

Guild of Gas Managers of New England.—Annual meeting, March, 1913. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 19th and 20th, 1913. Chicago, Ills. Officers: President, H. O. Channon, Quincy, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting,———— September, 1913. Meetings of Sections, monthly. Pres., V. R. Lansingh, Cleveland, O.; Sec., Preston S. Millar, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March 12 and 13, 1913. Indianapolis. Officers: President, Howard L. Olds, Indianapolis; Vice-President, Wm. Wallace, Lafayette; Secretary-Treasurer, Phimer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, May 22, 23, 24, 1913; Burlington, Ia. Officers: President, C. W. Fair, Atlantic, Ia.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October——1913. ———— Officers: President, L. O. Ripley, Emporia, Kas.; Secretary and Treasurer, W. H. Fellows, Leavenworth, Kas.

Michigan Gas Association.—Annual meeting, September——1913; ———— Officers: President, W. S. Blauvelt, Detroit, Mic; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1913; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting————————1913, Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, Cleveland, O., May 20-22, 1913; Officers: President, M. B. Daly, Cleveland, O; Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 19th and 20th, 1913 Boston. Officers: President, D. D. Barnum, Worcester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Winter Meeting. December 18, Newark N. J.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn Belmar, N. J.

Ohio Gas Association.—Annual meeting, February ———, 1913, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1913. President, F. W. Caldwell, Shawnee, Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, San Jose, Cal., September 16, 17, 18, 1913. Officers: President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, Henry B stwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April 9-11, 1913; Officers, President, H. H. Ganser, Norristown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 13, 1912; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city

Southern Gas Association.—Annual meeting, Charlotte, N. C., April 18-20, 1913, Officers: President, C. E. White, Montgomery, Ala.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May 21, 22, 23 and 24, 1913, Galveston, Tex. Officers: President, F. M. Lege, Jr., Galveston, Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 14 and 15, 1913, Milwaukee, Wis. Officers: President, L. F. Wortendyke, Janesville, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.